The Business Journal of Vegetation Management November 1978/1.25

WEEDS TREES & TURF

Shigo on the State of Urban Trees

Measurements for Portable Soil Testers

Profile of Cemetery Management

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WT&T

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LETTERS

I enjoy reading Weeds, Trees and Turf, and do appreciate the journal.

However, I want to take issue with a statement made in Vol. 17 (8) on page 38. In explaining excessive water evaporation from exposed sandtrap surfaces, the author indicates "... the sun heats up the exposed sand surface and causes rapid surface evaporation, it wicks water away from the surrounding soils." This explanation of the drying phenomenon being observed on the edges of sandtraps is highly unlikely as it would defy the laws of soil physics. Sand has no soil physical property which would allow it to draw water away from soil. A more likely explanation of the observed phenomenon would result from a combination of processes involving capillary movement of water in the adjacent soil to the surface for continuous drying, coupled with increased slope exposure frequently associated with sandtrap construction.

Sincerely,
J. R. Hall
Extension Specialist, Turf
Virginia Polytechnic Institute

On page 64 of the May 1978 issue, a clay soil is represented as having less pore space than a sandy (green mix) soil. If fact, the 80% solids in the clay soil would give a bulk density of greater than 2.0. In the second paragraph of the answer, the statement is made that only marginal amounts of non-gravitational water are held by clay. Such information is misleading to the reader and sure knocks a hole in our teaching efforts.

On page 38 and 39 in the August 1978 issue, the readers are cautioned about sand traps "wicking" water away from surrounding soils. Assuming that a good trap sand is used, I would guess that the mulching effect of the dry surface sand would tend to conserve water beneath and beside the sand. In other words, more water would be lost if no sand was in the trap or if the trap was not there but similar contours existed. Certainly a plastic liner would reduce any moisture losses, but is there any more need for a liner with a trap than without a trap?

I believe Weeds, Trees, and Turf is a valuable publication for those of us in the turf industry. I hope my comments will contribute to it becoming a better and more factual publication.

Donald V. Waddinton
Professor of Soil Science
The Pennsylvania State University

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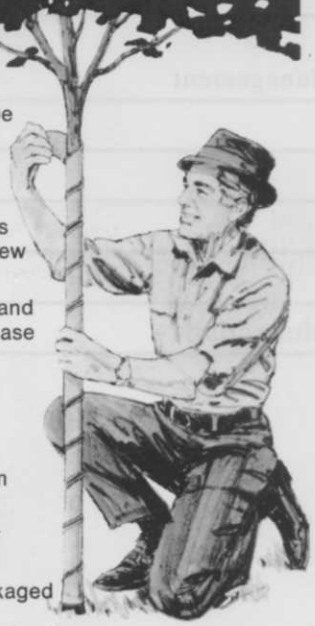

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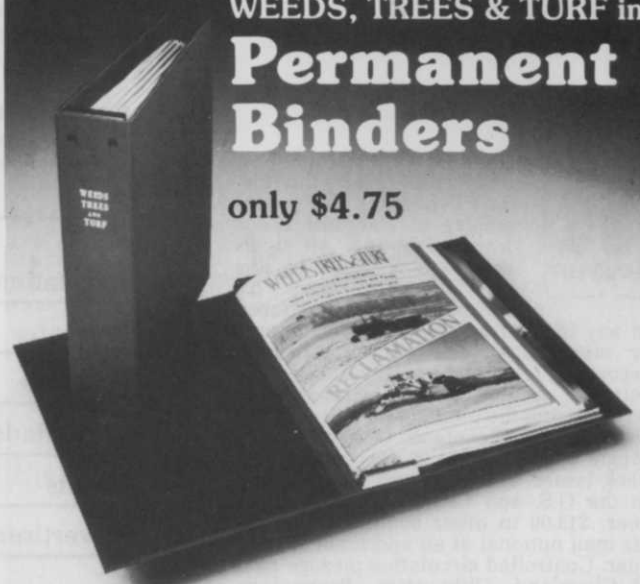

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GREEN INDUSTRY NEWS

FRANCHISES

Published court decision could boost risks

The published opinion of a Connecticut judge, in a preliminary decision in a comparatively unimportant suit for damages resulting from a leaking roof, may turn out to have an enormous impact on the entire field of franchising.

At the very least, according to Product Liability Digest, the decision is likely to lead to an increase in product liability insurance premiums for franchisors and, as a result, indirectly raise the prices of all franchised goods and services.

According to the article, a standard element in almost every franchise agreement is a license to use the franchisor's trademark. Discussions about the role of trademarks in marketing frequently mention that the trademark owner stands behind his product, that a trademark guarantees the quality of the product, and so forth. Extending this to a franchise situation, it could be said that the trademark owner, in a sense, takes responsibility for the licensee's product, which he must do because of the quality control requirements of the trademark law.

This statement has not generally been taken literally as a warranty, which would create liability for damages. Trademark experts agree that Congress never meant to impose that kind of financial risk on a licensor when it wrote the quality control provisions into the trademark law in 1946.

However, licensing without supervision by the licensor is the legal equivalent of abandoning the trademark, which means that the owner can no longer enforce his rights in it against anyone whether it is used with or without permission. The public is involved in this because the appearance of the licensor's trademark on uncontrolled products is considered to be a practice that is deceptive to the consumer.

According to the judge's analysis, the license agreement between the licensor and the licensee guaranteed to the public that the product sold under the licensor's tracemark by the licensee was of the same nature and quality as it would have been if sold by the licensor. The situation thus met the legal test for "strict liability".

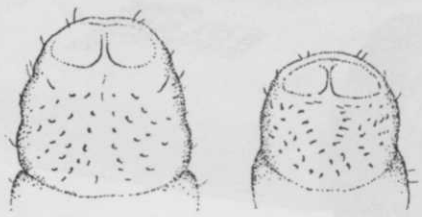
INSECTS

Ataenius has name similar insect

Dr. Harry Niemczyk, Professor of Turfgrass Entomology at the Ohio Agricultural Research and Development Center in Wooster, has informed WEEDS TREES & TURF that the 1978 Committee on Common Names of Insects, from the Entomological Society of America, has approved "black turfgrass ataenius" as the common name for Ataenius spretulus.

Dr. Niemczyk has also discovered another beetle that damages turf at the same time Ataenius larvae do. This insect has been determined as Aphodius granarius. Dr. Niemczyk has found larvae of this species damaging turf in Boulder, Colorado and at two golf courses in Detroit, Michigan. At first glance, according to Dr. Niemczyk, the Aphodius larvae appear identical to Aetenius. However, the Aphodius are slightly larger and have a somewhat darker head capsule. The V-shaped series of spines located in the raster of Adophius is the most outstanding identifying characteristic. (See drawing).

If you come upon an infestation during June or July, which appears to be Ataenius, check the larvae carefully to determine the possibility of the other species being present. Dr. Niemczyk would like to know the extent to which either of these species is present. Contact him at OARDC, Wooster, Ohio, 44691, or phone 216/264-1021.



The real Ataenius (left) and its look-alike the Aphodius (right).

FERTILIZER

Lakeshore sulfur-coated fertilizers plant opens

The first commercial plant in the U.S. to produce slow-release, sulfur-coated fertilizers began operations under the direction of Ag Industries Mfg. Corp. (AIM) in Columbia, Ala. last month.

The AIM plant is sulfur-coating urea, a water-soluble nitrogen fertilizer compound, along with phosphorus and potash to produce a complete fertilizer.

The AIM corporation is wholly owned by Lakeshore Equipment & Supply Co., Elyria, Ohio, a major supplier to the lawn care industry.

The company said the sulfur

When keeping your turf reputation up means keeping maintenance costs down . . .

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Chewings Fescue

You have a big turf area that's your responsibility. The instructions are, "Keep it looking good, but hold maintenance costs down." Sound familiar? We know it's a real challenge for a pro. But there is a solution. Banner Chewings fescue.

Banner does well under low fertility and moisture conditions. Even low pH. But Banner still gives you quick germination and seedling vigor. A dense, moderately low growing turf that is highly competitive under low maintenance management. A sod of high tensile strength.

Developed at Rutgers University, Banner has been continuously evaluated in tests and trials throughout the U.S. and has shown itself to be the answer for large turf areas where abuse and minimum maintenance make turf management difficult.

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GOVERNMENT UPDATE

FIFRA pesticide uses to be more liberal

A liberalized approach to uses of a pesticide that are not in literal accord with the printed label on a product is one of the amendments to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) that a House-Senate Conference Committee has approved.

Other amendments include: Conditional registration permitting the Environmental Protection Agency (EPA) to register products similar to old chemicals or providing new uses for them; a "generic standards" approach allowing EPA to make broad decisions for an entire group of products containing the same ingredient; and a diminished requirement for reviews on the efficacy of pesticides, according to Steven D. Jellinek, assistant administrator for Toxic Substances.

Jellinek said that it was "very frustrating" to have to turn down numerous applications because of a double standard that allows continued use of products already registered but requires a full complement of registration data before identical new products can be registered.

EPA plans to issue regulations for conditional registration within the new few months, and begin issuing such registrations immediately thereafter, Jellinek added.

The generic standards approach to re-registration of existing pesticides will make possible a more streamlined procedure rather than the present practice of regulatory decisions on a product-by-product basis.

Jellinek also said that the amendments provide a new definition of "use inconsistent with the label". It makes it clear that certain practices, which may not be in strict or literal accord with the printed label, are nonetheless legally consistent with label directions.

"Specifically, pesticide applicators could use less than the specified label dosage to treat for a pest not listed on the label, to mix pesticides and fertilizers on a broader basis, and to employ responsible methods of application not specified on the label.

"We expect that these changes will introduce a welcome measure of common sense to pesticide use enforcement, which incidentally will become even more of a state responsibility than it is now."

State inspectors would be the primary enforcers of FIFRA, in states with approved EPA plans, under the new amendments. Approval of the amendments is expected by the House, Senate, and President Carter.

Department of Labor interprets FLCRA

Originally intended to apply only to third party contractors, the Farm Labor Contractor's Registration Act has been interpreted by the Department of Labor to include every farmer, processor, and packer of agricultural or horticultural commodities who recruits, solicits, hires, furnishes or transports agricultural labor.

There are two exemptions: Any person who engages in covered activities solely within a 25 mile intrastate radius of his permanent residence and for not more than 13 weeks a year; and any farmer, processor or nurseryman who personally engages in such activity for the purpose of supplying migrant workers solely for his own operation.

The last exemption does not apply to a corporate farmer unless the corporation is under the effective control of an individual whose authority is equivalent to that of a sole proprietor and if that individual acts in person with respect to the farm labor contracting activities for the corporation.

If a "person", as defined by the act to include any individual, partnership, association, joint stock company, trust or corporation, engages in any of the activities named, he must first register with the U.S. Department of Labor as a Farm Labor Contractor.

Continues on page 42

coating slows the dissolution of the fertilizer in the soil, making the fertilizer last longer, reducing the number of applications required and producing more even plant growth. Many lawn care businessmen across the country use some sulfur-coated urea fertilizers in their lawn care programs, and others are considering the fertilizers.

The AIM corporation is licensed by the Tennessee Valley Authority (TVA) to use methods developed by TVA at its National Fertilizer Development Center in Muscle Shoals, Ala. to produce the sulfur-coated fertilizers.

A similar facility in Willowdale, Ontario in Canada is owned by Canadian Industries, Ltd,., and coats urea. It also supplies the lawn care industry and other turf managers in the United States.

Ronald A. Smith is the chief operating officer and project manager for AIM.

Lakeshore spokesmen said that agronomic testing by TVA and numerous universities across the nation has proven sulfur-coated urea to be an excellent fertilizer for lawns and other turfgrasses.

When compared with a single application of soluble fertilizer, sulfur-coated urea gave less growth immediately following fertilization, but better growth throughout the lawn care season, without excessive need for mowing and with minimal fertilizer burn. In three-year studies, it produced more uniform seasonal bermudagrass growth than a single or split application of soluble sources of nitrogen.

Lakeshore spokesmen also said that sulfur-coated urea has been shown to be an economically priced slow-release fertilizer compared with other products on the market. They note that some slow-release fertilizers currently available to the lawn care businessmen cost two to three times as much as conventional nitrogen fertilizer.

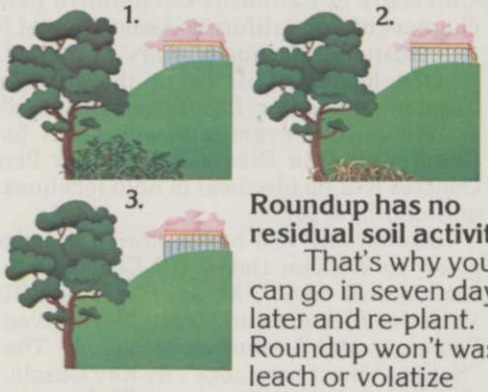
Roundup®. There's no better grooming aid for unruly turf.

Roundup® belongs in your turf renovation program.

Renovation of a weedy fairway, sod farm or other grassy area used to be a laborious and time-consuming chore, but not any more.

Not with Roundup® herbicide by Monsanto. Because one application of Roundup will control many annual and perennial weeds, yet allow you to proceed with tillage and planting operations as soon as seven days later.

Roundup also makes sense wherever treatments for grounds maintenance are called for. One man with Roundup in a backpack sprayer can replace many of the herbicides and frequent repeat treatments that are often necessary.



Roundup has no residual soil activity.

That's why you can go in seven days later and re-plant. Roundup won't wash, leach or volatize from the treated area to injure desirable vegetation. Naturally, normal precautions should be observed to avoid spray drift.

Roundup gets to the root of the problem.

Including many of your toughest vegetation problems, like: bluegrass, bermudagrass, quackgrass, bindweed, johnsongrass, fescue and vaseygrass.

Can you afford to let another season go by without Roundup in your turf renovation and grounds maintenance programs? Your local chemical dealer is the one to see for your supply of Roundup herbicide.

"Translocation" is the key.

Roundup is applied to the weed foliage, absorbed through the leaf surface, and "translocated" throughout the entire plant. In this way, Roundup destroys the entire weed, including the roots or rhizomes.

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Landscape Contractor News

SBA now guarantees contractor bonds

The Small Business Administration can now guarantee surety bonds for contracts up to $1-million to any contractor required to have a bid, performance or payment bond. Under the program there is no limit to the number of bonds guaranteed for any one contractor.

In consideration of the Surety Company's paying the Small Business Administration (SBA) 20 percent of the gross bond premium, SBA guarantees the Surety Company up to 90 percent of any loss sustained on contracts up to $250,000 or greater, subject to a $500 maximum deductible to the Surety Company regardless of the contract amount.

The contractor must pay a fee of 0.2 percent of the contract amount to SBA, if SBA provides the bond, as well as a maximum 1½ percent premium charge for the bond on the first $250,000 of the contract amount and one percent on the excess to the Surety Company.

Contact the nearest SBA office for full details.

UC will offer 5-week hort course

A five session horticulture short course, jointly sponsored by the University of California Cooperative Extension and the five southern chapters of the California Association of Nurserymen, will be given in two locations, starting January 23 and 24.

One location will be at the Veterans Administration Hospital, Brentwood Theater, Brentwood, on Tuesday evenings starting January 23. Wednesday evening sessions will be given at the Diamond Bar Country Club in Diamond Bar, near Pomona, beginning January 24. Courses will be identical in both locations. Session will start at 7:30 PM and end by 9:30.

Session one will be "Watering Practices in the Home Landscape", given by William Davis, UC Cooperative Extension at Davis. Second session will cover "Monday Morning Blaghs, Cure Them with New Varieties-Flowers and Vegetables", given by James Wilson, Executive Secretary of All America Selections. The third session will deal with "Selling Your Customers", by Ray Cusato, President of Ray Cusato and Associates. Fourth Session will discuss "Native Plants in the Home Landscape", given by Peggy Sears McLaughlin, Cal-Poly. "Diagnosing Home Landscape Problems" will be presented by Paul Rogers, Kellogg Supply, Inc., during the fifth session.

Pre-registration is necessary. Registration fee is $17. A reference book will be provided and a certificate of completion will be presented to those attending four of the five sessions. The last course attracted over 470 persons in the nursery and landscape industry.

Contact is Ted Stamen, Ornamental Horticulture Farm Advisor for Los Angeles County, phone 3213/744-4885; or Mike Henry, Ornamental Horticulture Farm Advisor for Orange County at 714/744-7050; or Ed McNeill, registration coordinator, phone 213/798-1715.

Land Imprinter controls runoff

The "land imprinter", developed by Dr. Robert M. Dixon, soil scientist with the Agricultural Research Service's Tuscon, Arizona research center, may help establish grasses on near-barren dry areas. Based on a new concept for controlling rainwater infiltration, the air-earth interface (AEI) concept, the imprinter is being used experimentally in two coal mine's reclamation programs.

Utah International has planted four one-acre plots at its mine near Fruitland, New Mexico, but hasn't collected data as of yet. Native grasses and shrubs have been planted on heavy clay topsoil, sandy soil and loamy soil, according to John Blueyez, director of experimental reclamation programs.

Continues on page 42

EDUCATION

ChemLawn, OSU to hold turf disease symposium

Leading turfgrass disease specialists from the United States and Canada have agreed to participate in a special symposium on turfgrass disease to be held May 15-17 at the University Holiday Inn in Columbus, Ohio.

The symposium is sponsored by Ohio State University, the Ohio Agricultural Research and Development Center and ChemLawn Corp., Columbus.

The event is open to all lawn care businessmen and other turf managers from around the country.

For further information write: "A Symposium of Turfgrass Disease 1979," 2865 East Orange Road, Galena, Ohio 43021. Or call Dr. P.O. Larsen at 614-422-6987, or Dr. B.G. Joyner at 614-885-9588.

SCIENTISTS

Beard of Texas A&M named to Musser Board

James B. Beard, professor of Turfgrass Physiology in the Soil and Crop Sciences Department of Texas A&M University, has been named to the Board of the Musser Turf Foundation.

The Musser Foundation is a nonprofit foundation created in honor of Pennsylvania turf professor H. Burton Musser, to support basic research in turfgrass. The work with Ataenius has been supported from the beginning by the Foundation.

Fred Grau, Foundation director made the announcement in October. Grau said, "We are extremely pleased to have Dr. Beard on the Musser board and feel his contribution will be very significant to the advancement of basic turf research."

SEED

Coated grass seed available in spring

Oseco, Inc., Brampton, Ontario, has announced that it will introduce a coated grass seed beginning next spring.

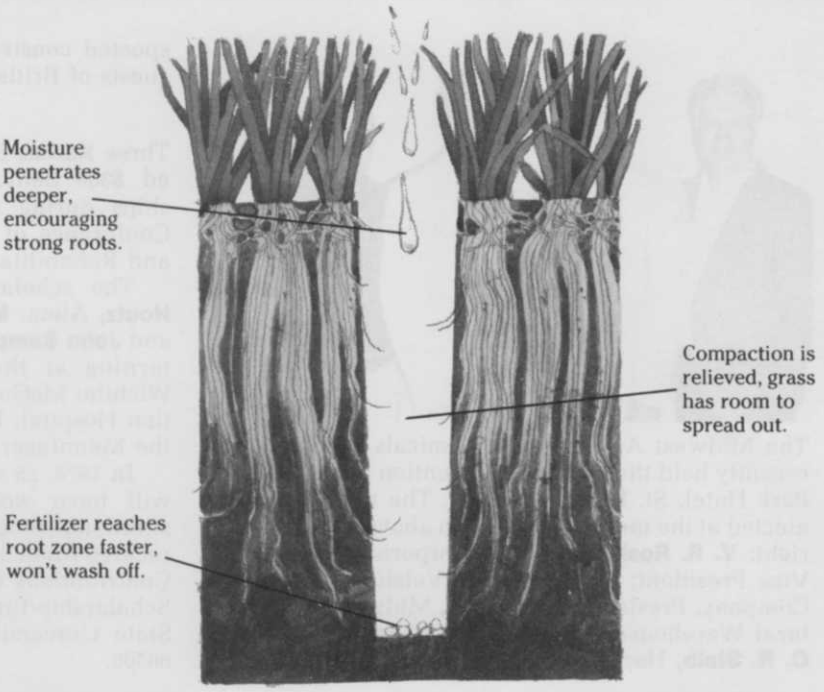
Continued on page 40

What can a hole in the ground do?

When your grounds become hard-packed from constant use and temperature changes, or if the ground is naturally hard, grass has a tough time growing.

The answer is aeration.

These holes allow air, water and fertilizer to penetrate to the root zone where they're needed. They relieve compaction, giving grass room to grow. New, more drought-resistant roots are stimulated. And the turf takes on a springy, soft feel.


Moisture penetrates deeper, encouraging strong roots.
Compaction is relieved, grass has room to spread out.
Fertilizer reaches root zone faster, won't wash off.

Ryan makes two pieces of equipment specifically for aeration of parks, athletic fields, playgrounds, golf course fairways, or any large turf area.

The Ryan Renovaire® is designed to contour aerate compacted turf on hilly as well as flat areas. Its 12 tine wheels are mounted in pairs, operating independently to give both high and low spots equal penetration.

The Ryan Tracaire® is used to aerate large level areas, especially athletic fields. Mounted by a 3-point hitch, it gets the job done quickly, easily, efficiently.

Both the Renovaire and the Tracaire can be equipped with coring, slicing or open spoon tines for aerating all types of soil in all seasons. Both can be used with a 12-foot-wide dragmat to break-up cores and groom the grass. And both are built to last, like all Ryan equipment.

Give your large turf areas room to breathe with the Ryan Renovaire and Tracaire aerators. You'll see the green, healthy difference a few simple holes can make.

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PEOPLE

The Midwest Agricultural Chemicals Association recently held their annual convention at the Chase Park Hotel, St. Louis, Missouri. The new officers elected at the meeting are shown above from left to right: **V. R. Roskam,** Oil-Dri Corporation, Second Vice President; **R. C. Moreau,** Velsicol Chemical Company, President; **Larry Bert,** Midwest Agricultural Warehouse Company, First Vice President; **C. R. Staib,** Hercules, Inc., Secretary Treasurer.

The Florida Turf-Grass Association elected new officers and directors at the annual conference and show held in Orlando in October. New president is **C. Wayne Sloan,** assistant vice president of Gulfstream Land and Development Corporation in Plantation. Immediate past president is **David L. DeBra,** executive vice president of operations for DeBra Turf and Industrial Equipment Company in Hollywood.

Harvey E. Phillips, Belleview Biltmore Hotel and Golf Course, Clearwater, was elected vice president. Phillips was a director. **James T. Carter,** president of Bingham Seed Company in Jacksonville, was elected secretary-treasurer.

New directors are: **W. Timothy Hiers,** superintendent at Suntree Country Club in Melbourne; **Lloyd D. Purdy,** sod division supervisor for A. Duda and Sons in Oviedo; **Robert B. Sanderson,** superintendent at General Development Corporation in Port Charlotte; **Michael Swanson,** vice president of Pursley Turfgrass Company in Pinnellas Park; and **William G. Wagner,** Golf course superintendent at Tequesta Country Club.

An examination of British golf course construction was undertaken by members of the Golf Course Builders of America. Builders **David Canavan** of Moore Golf, Culpeper, Va.; **Frank Underwood** of Bowie, Texas; **James Kirchdorfer** of ISCO, Inc., a Louisville, Ky. irrigation supply company; and **Harry Lambeth,** executive director of GCBA, inspected construction in Scotland and England as guests of British builders.

Three Kansas State University seniors were awarded $300 Senior Horticultural Therapy Scholarships during the banquet at the sixth annual Conference of the National Council for Therapy and Rehabilitation through Horticulture.

The scholarship winners announced: **Becky Houtz,** Alma; **Maureen McGowan,** Columbia, Mo.; and **John Sampson,** Clay Center, Neb. Houtz is interning at the Kansas Elks Training Center, Wichita; McGowan is at the Veterans Administration Hospital, Roseburg, Ore.; and Sampson is at the Menninger Foundation, Topeka.

In 1978, 25 senior horticultural therapy seniors will have worked 25,000 hours within 12 institutional programs. Many of the students do not receive financial support during their internships. Contributions to the Senior Horticultural Therapy Scholarship fund can be made through the Kansas State University Endowment Office, Manhattan, 66506.

Paul N. Kultgen, of Random Lake, Wis. has been promoted to the position of service supervisor at Simplicity Manufacturing Co., a leading builder of powered lawn and garden equipment.

Most recently he was consumer service representative. In his new position, he will be responsible for all aspects of warranty administration, field service, factory service and service training.

Kultgen joined Simplicity as an assembler in 1965 and has held various positions of increasing responsibility in the service department since 1971.

Dave Davis has been promoted to Manager of the Training Department at Rain Bird Sprinkler Mfg. Corp. In his new assignment, Davis will be responsible for all internal and external training programs.

Rain Bird currently offers 15 different training seminars. During his 7 years at Rain Bird, Davis has conducted 325 design schools with over 8,000 people in attendance. This program will continue on an expanded basis under his leadership.

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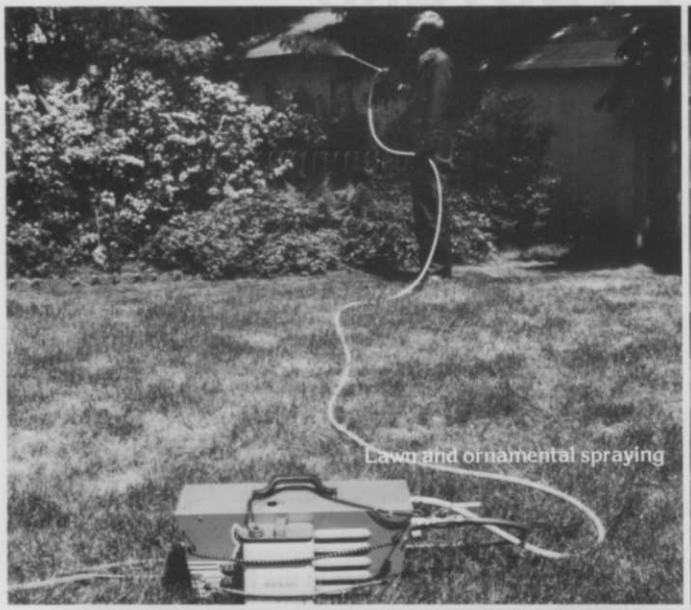
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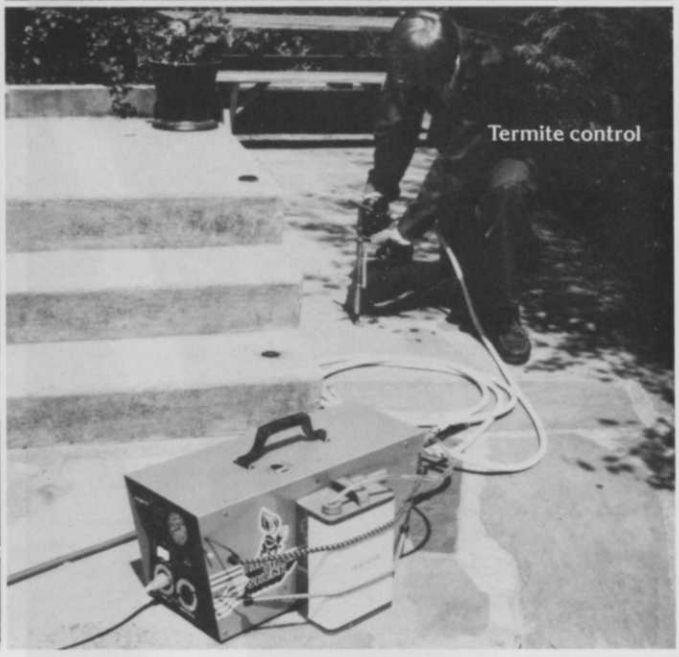
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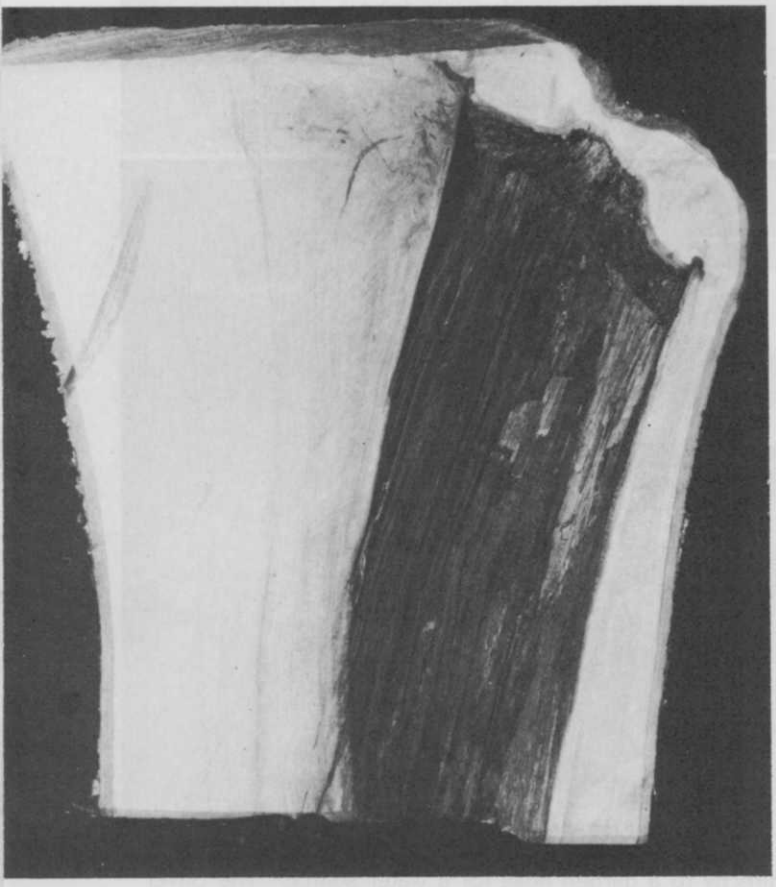
DEALING WITH DECAY FACTORS IN OUR URBAN FORESTS

By **Alex L. Shigo**
Chief Scientist, Plant Pathology
U.S. Forest Service
Northeastern Forest Experiment Station
Durham, New Hampshire

"You become responsible, forever, for what you have tamed."
(Antoine de Saint Exupery: The Little Prince).



The diameter of the hollow in the above tree was the diameter of the large stem at the time it was cut. The defect was compartmentalized. When cavities are filled, care must be taken to minimize breakage of the compartment rim surrounding the cavity. The diameter of the defect in the birch at right is the diameter of the tree when it was wounded. The defect was compartmentalized. The wood formed after the injury was not infected.

We have tamed our urban trees. We are responsible for their care.

A quick look at the condition of some of our urban trees will show that we have not met our responsibility. We seem to see more and more urban trees in trouble. Is it because we are becoming more aware of our trees? Or is it because the condition of our trees is declining? Probably both.

It is one thing to recognize a problem and another to do something constructive about it. What can we do to help our urban trees? Where should we start? Who should do it? Important questions. Here are some answers.

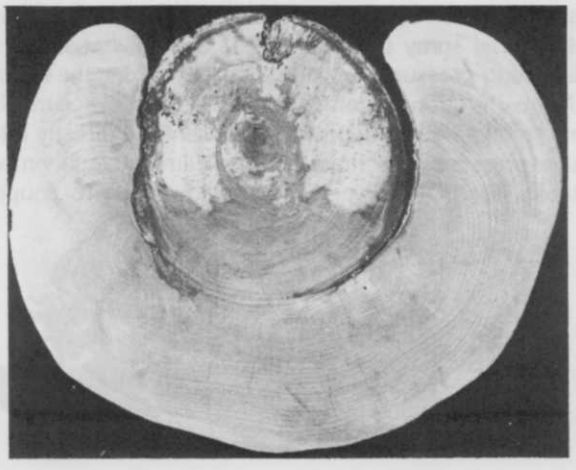
Awareness

Awareness of a problem is the first step toward solution.

Too many people take trees for granted. Trees are considered so tough that they are thought to be able to take anything and everything we and nature can throw at them. As long as there are a few green leaves on a tree, it is considered healthy by most people. Trees can take only so much abuse before they begin to wane. *We must start a national awareness program for the proper care of our trees.*

Myths and misconceptions

There are too many myths and misconceptions about proper tree care, for several reasons: 1) Tree care procedures are often based on incomplete or incorrect information. 2) Someone did what he though was correct many years ago and the procedure has never been challenged or changed. 3) People often try to "play doctor" with trees and treat trees as they think a human doctor would treat a patient—clean the tooth cavity thoroughly, dress the wound with some protective and healing material, inject with a variety of materials, etc. Indeed, it is time to take a hard look at some of our tree care procedures.



First aid for trees

We need answers from research to help us with many tree problems, although we do have an abundance of sound information on proper tree care now. The trouble is that old sound information is not being used and the person who needs the new information has not received it in a form that enables him to understand and use it. To solve the first problem, we must enforce or "put some teeth" into tree care contracts to make certain that well known sound principles and practices are followed. For example, there is no excuse for planting improperly, planting off-site, and pruning improperly, when we have sound information on these procedures. Yet our knowledge of these basic procedures is too often not followed.

To solve the second problem we must find better ways to package new information so that it will reach the people who need it. What's the use of "knowing the secret of life" if you can't tell somebody about it in a way he will understand? It is the responsibility of the researcher to package new information. It is time to take a new look at our tree care procedures.

Forest tree — urban tree

When a tree is sick, it is sick. This is true regardless of where it is growing, in the forest, in your yard, or along a city street. It is time we recognized this. But there are some problems unique to urban trees: Most urban trees are planted. Sometimes trees are planted off-site or in the path of stress and wounding agents—lawnmowers, cars, snowplows, etc. The off-site tree or constantly stressed tree will wane and die.

Forest trees grow under a wide variety of stresses. Only the toughest survive. Urban trees coming from the safety of a nursery never experience wounding and other stresses until they are planted. Care must be taken in using information about forest trees for urban trees. But some basic information can be used for both forest and urban trees.

Expanded concept of decay

Decayed wood associated with wounds has been, still is, and no doubt will continue to be a major problem of all trees throughout the world, regardless of where they are growing. The classical concept of tree decay emphasized characteristics of decayed wood, taxonomy of decay-causing fungi, and predictions of the proportion of cull trees for great numbers of trees in forests. The expanded concept of tree decay includes tree response to wounding and infection — Compartmentalization — and the interaction of many types of microorganisms in the processes that can lead to discolored and decayed wood — Succession. Compartmentalization and succession are orderly processes. Order can be regulated and understood. The more we understand the order of the decay processes, the better are our chances of regulating them.

Commonly used asphalt-based wound dressings do not stop decay. The tree above was improperly pruned and coated with a wound dressing. Such treatment does more harm than good.

New decay model

A model—CODIT, Compartmentalization Of Decay In Trees—describes how discolored and decayed wood develops in living trees. On the basis of the expanded concept of tree decay and CODIT many tree care procedures have been re-examined. Here are some examples:

Wounds are major problems

Wounds are a major cause of injury to urban trees. Wounds start the processes that can lead to decayed wood; which can lead to hazardous, unattractive, and low-quality trees. Root, trunk, and branch wounds inflicted during construction of buildings and roads rank as a major type of injury. The injury is often not obvious until 5 or even 12 years later.

Trees do not heal wounds

A wound is a break in the bark that exposes the xylem. Once xylem is injured it is never repaired, replaced, or restored to its previous healthy state. In this sense, trees do not heal wounds. (Heal means to restore injured tissues to their previous healthy state.) Trees wall off or compartmentalize

wound xylem. Compartmentalization is an alternative to healing that has great survival value for trees.

Wound dressings do not stop decay

Commercially prepared wound dressings—particularly the asphalt-based types—do not stop decay. When applied in a thick coat they can cause more decay. The dressings are primarily cosmetic for the tree and psychological for the tree owner. When wounds are treated, three factors must be considered: 1) closure, which is related to current growth rate; 2) dieback of cambium around the wound, which is related to time of wounding and position and severity of the wound; and 3) internal walling-off or compartmentalization of decay, which appears to be under genetic control.

Biological control treatment of wounds

Results of recent research suggest that biological control agents such as the fungus *Trichoderma harzianum* delay the invasion of decay-causing fungi for at least 2 years in red maple. Research with other materials at the author's laboratory show that wound dieback can be decreased, and that other treatments delay the development of decay.

A decayed tree posing a threat to a greenhouse and residence. Too often people learn about decay too late.

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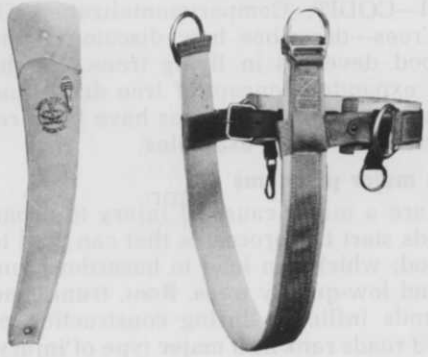

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Compartmentalization appears under control

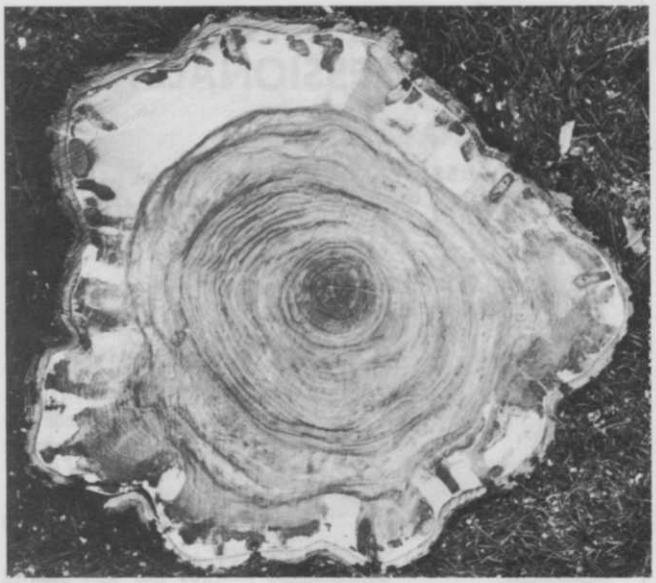
Compartmentalization of injured and infected wood appears to be under genetic control. Some trees of the same species can compartmentalize decayed wood to a smaller volume than other trees. This means that we may be able to select trees that can withstand the stress of many wounds over many years, and still have only small columns of decayed wood. This brings us closer to having decay-resistant trees.

Pruning can be good or bad

Proper pruning can help a tree; improper pruning can hurt a tree. A proper pruning program should be established early in the life of a tree and continued throughout its life. The best time to prune is late in the dormant period. The worst time is when the leaves are expanding, or soon after the leaves begin to fall. In the spring the bark is loose and dieback may develop. In the fall, wood-inhabiting microorganisms produce an abundance of spores that can infect wounds. When pruning dead or dying branches do not cut the living callus collar around the stub. This is an instance where flush cuts are not recommended.

Hazard trees: new detection methods

Decay can make trees hazardous. An electric pulsed-current meter—the Shigometer®[1]—gives information that can be used to detect decayed wood rapidly and accurately in living trees. The new electrical method can also be used when



Cross-section of the base of an elm tree that had received numerous injections for prevention of Dutch elm disease. Deep injection wounds repeated for several years can cause severe internal injury.

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This basic 300 gallon unit can be expanded to whatever size spray rig desired by simply adding more tanks — eliminates purchasing new equipment as business expands.

This basic spray rig is designed to fit in a pick-up truck, the tank situated between the rear wheel well and cab of truck. The motor, pump and hose reel on the right side leaving the remainder of the truck bed for other equipment and supplies.

Van pictured shows the basic spray unit in the van, leaving the entire rear area for storage of products.

As you will see, these sprayer units have been designed with a great deal of thought, research, and years of experience. They are designed and built by professionals, for professionals. For more details, either call or write Mr. Pierce.

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Urban Trees

cavity fillings are planned. The proper installation of rods and other hardware can then be determined. The proper use of the Shigometer requires some skill and practice.

Cavity filling: don't play dentist!

When cavities are filled, great care should be taken not to clean out the decayed wood so thoroughly that healthy wood is injured from the inside of the tree. The decayed wood is compartmentalized in the tree by a tough rim of protective tissues. If this protective rim is broken from the inside, decay will spread rapidly from the cavity to the surrounding healthy tissues. Cavities can still be filled for aesthetic reasons or to form a base for the inrolling callus.

Proper bracing and cabling

The time a tree can remain safe and attractive can be extended by proper cabling and bracing. When hardware is put into healthy tissues, the injured wood will be compartmentalized. But when holes are put into decayed wood, the decay will spread rapidly into the surrounding healthy wood. When hardware is used in a trunk that has decay, the rod must go *completely through* the stem, and washers must be placed on the outsides. The washers will hold the rods in place even though decay may develop around the rod. Do not dead end rods that penetrate decayed wood.

Injection wounds can injure trees

Many holes are being drilled into trees to inject chemicals. Great care must be taken when injecting chemicals. A hole is a wound. Deep drill wounds repeated for several years can cause severe internal injury. When internal columns of injured wood coalesce, large pockets of dead wood will result. Dieback around deep injection holes can also lead to cankers. When injections are necessary because of infection, the holes should be as few, as shallow, and as clean-edged as possible. Until better injection methods are developed, go very carefully!

Holes for draining water can cause problems

Holes drilled into decayed wood to drain water can cause severe injury to a tree. Decay will spread rapidly into the healthy wood surrounding the hole. But holes can be drilled into wetwood without spreading decay. Wetwood is a wood condition caused by bacteria; the wetwood is not decayed.

Seams usually start from wounds

Large, deep invaginated cracks, commonly called frost cracks, are usually not initiated by frost. Wounds start the processes. The cold or frost acts as a trigger. Most large so-called frost cracks start from the inside and spread outward. Weakened areas on the trunk also act as starting points for other types of seams, especially when temperatures drop rapidly. These seams are usually very shallow.

And remember, we have tamed urban trees and we are responsible for their proper care! **WTT**

Sure, there's more to maintaining quality, disease-free turfgrass than a couple of fertilizer applications. But turfgrass scientists across the country are reporting that a fall application of IBDU (31-0-0) can produce turfgrass with better root development and less disease problems.

Dormant turfgrass plants continue to produce rhizomes and roots, even though vertical growth has stopped. During this time nitrogen should be made available to the turfgrass plant as carbohydrates are naturally accumulating. Thus, scientists say, the optimum timing for nitrogen applications is during the fall and early winter months.

IBDU (31-0-0) is ideally suited for dormant nitrogen fertilization. Because of it's slow release characteristics based on hydrolysis, IBDU releases nitrogen later in the fall and earlier in the spring promoting better rhizome and root growth. A fall fertilizer program using IBDU should produce healthier more vigorous turfgrass plants and reduce the severity of several turfgrass diseases.

Remember. Healthy turf next spring starts with IBDU this fall.

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SOIL PROPERTY DETERMINATIONS POSSIBLE WITH PORTABLE TESTERS

The physical and chemical properties of a soil profile must be well understood in order to institute a management program that will take advantage of characteristics favorable to plant growth and overcome those that limit soil's function as a growth medium. Even the hardiest of plant species will not grow unless basic metabolites are present.

Soil testing, in most cases, is done by technicians in well equipped laboratories. However, companies making soil test kits have simplified them to the point that it is easy for a grounds manager to perform many spot tests and make immediate corrections, or to sleep better, knowing that his plants are growing under optimum conditions.

The sand:silt:clay ratio, types of clay, the physical and chemical nature of the soil separates, aggregate stability, particle and bulk densities,, pore space, and organic matter content of a soil can provide insight into management techniques that take advantage of natural properties and overcome detrimental qualities.

Understanding pH and its relationship to nutrient release in the soil solution is important. Buffer pH must be overcome in initiating any change in pH. Cation exchange capacity can provide insight into a soil's ability to take fertilizer additions into solution and render them into compounds for plant uptake.

Plant tissue analysis can be used to indicate uptake of some nutrients and is probably the best test for nitrogen utilization by plants.

Soil pH

Soil reaction, or pH, is recognized as one of the more critical properties of a soil solution.

Whether a soil is acid, neutral, or alkaline depends upon the ratio of hydrogen ions (H+) to hydroxyl ions (OH—) in the soil solution. As a calculation, pH is expressed in terms of the H+ concentration. The pH value is the logarithmic reciprocal of the hydrogen ion concentration. As a simple formula: pH=log 1 (H+).

In mathematical terms, a pH value of 7 indicates neutral conditions with a 1:1 ratio of hydrogen and hydroxyl ions. Moving in either direction, acidic or alkaline, from a neutral value, the values for pH increase in logarithmic increments.

This can best be understood by realizing that while, at a pH of 6, the hydrogen ions are 10 times more numerous than the hydroxyl, the hydroxyl ions have decreased proportionately and are only one-tenth as numerous.

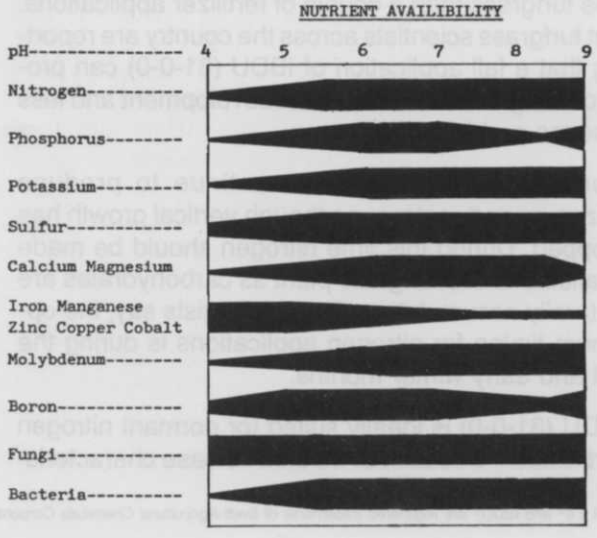
This inverse relationship leads to a 100 times increase in one ion concentration over the other, as pH values move in either direction. At ph, 8, there are 10 times more OH— ions, but only one-tenth as many H+ ions. The concentration of OH— ions is therefore 100 times greater than H+. The solution is alkaline.

However, while establishing a mathematical pH value is a rather stable operation, the value can be distorted if it is not standardized against soil performance.

Concentration of the ions occurs at different areas within the soil solution. Hydrogen ions tend to concentrate at the soil colloidal surfaces creating more alkaline conditions in the outer areas of the soil solution.

With a meter, pH can be determined accurately. However, because of this precision, interpretations may be made on false pretenses. Seasonal variations in pH within a given location, localized effects of fertilizer applications, and the amount of water used to prepare the soil prior to measurement can give an inaccurate indication.

Even with these limitations, pH is extremely indicative of the physiological conditions of a soil. The relationships between nutrient availability and microorganism activity at different pH values can be



broadly correlated within an optimum range for a plant species.

Addition of lime to raise the pH value, or sulfur to lower it, are probably the most generally recognized methods to manage soil pH. In limited cases, addition of acid organic compost to a soil can also be used to lower pH.

The reserve acidity, or buffer pH, provides resistance to immediate pH change in the soil solution. If other factors remain equal, the buffering capacity of a soil solution will remain at a capacity consistent with the exchange capacity of the soil.

To affect a pH change in an acidic soil, both active and reserve acidity must be considered. Active acidity is the obvious pH resulting from a measurement of the soil solution. Reserve acidity is more complex. It consists of hydrogen and aluminum ions held on the soil colloidal surfaces. As the hydrogen ions making up the active acidic portion are neutralized, these colloidal ions move outward and become active. Reserve acidity is generally much greater than active acidity and plays a greater role in deciding the amount of material to apply to affect a change in pH.

Cation exchange capacity

Cation exchange capacity, as well as clay type and content, and organic matter content can be interpreted to give an idea of the buffering capacity of a soil.

Cation exchange capacity (CEC) is a measure of positively charged ions that are held to the organic and clay colloidal surfaces. The CEC varies with the amount of organic matter and the amount and type of clay. Soils with more clay and organic matter tend to have higher CEC's.

CEC is measured in milliequivalents per 100 grams of soil or material being measured. A milliequivalent is one milligram atomic weight of hydrogen or the amount of another ion that will displace that amount of hydrogen. A soil with a CEC of one milliequivalent will exchange one mg of hydrogen or its equivalent for every 100 grams of soil. A hectare (2.47 acres) of soil to a depth of 15 centimeters (6 inches) could absorb 22 kilograms (48.5 lbs.) of exchangeable hydrogen or its equivalent.

Calcium has two positive charges compared to one for hydrogen. Its atomic weight is 40. Twenty (40 /2) milligrams of calcium are thus required to replace one milligram of hydrogen. 22 kilograms (a factor of 1,000,000) would require 1100 kilograms of calcium carbonate ($CaCO_3$, ordinary limestone).

When applying limestone to established turf, it is recommended that no more than 25-50 pounds of finely ground material, more if coarse, be applied. On highly acidic soils with established turf, it is recommended that limestone be added over a period of two, three or more years to avoid the detrimental effects of a large amount at once.

While limestone application rates are generally recommended according to soil texture, there can be extreme variation between soil types with similar textures. Sands and sandy loams can have a CEC ranging from 2-17 milliequivalents. Loams and clays can range from 8-60 milliequivalents.

A county soil survey map, available from the Soil Conservation Service (if your county has been mapped) will indicate the soil series and expected CEC. Management practices will have affected the rate.

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Humus and clay

Clays make up the inorganic portion of soil and humus makes up the organic portion. Together they make up the colloidal portion of the soil.

The amount of humus in a soil can significantly influence its characteristics. Humus contributes directly to better physical properties, improves nutrient availability, and imparts a higher cation exchange capacity.

Humus is made up basically of two types of complex compounds: those resistant to further decomposition; and those that have been synthesized by microorganisms and are held as part of their tissue structure. Because of the relative resistance to microbial breakdown, the nutrients held in the humus are resistant to ready solution and provide a long term release of nutrients.

The cation exchange capacity of humus can range from 150 milliequivalents per 100 grams to 300 milliequivalents. Thus the greater the humus content of a soil, the greater its influence will be on CEC.

Clays play a significant role in determining CEC of a soil. The silicate clays are more typical of the temperate regions and of the more productive agricultural soils.

The silicate clays are broken down into classifications based upon the relationship of aluminum and silicon layers within the clay structure. A 1:1 type clay, such as kaolinite or halloysite, lends the least to soil properties. CEC of kaolinite is expected to range within 3 to 15 milliequivalents. Montmorillionite, a 2:1 (two aluminum layers sandwiching a silicon layer) expanding type of clay commonly ranges between 80 and 100 milliequivalents and lends substantial character to a soil due to its swelling and shrinking capabilities. Ilite is a 2:1 non-expanding type of clay and falls within an intermediate range, commonly having a CEC of 15-40 milliequivalents.

Organic matter (humus) and nitrogen availability share a close relationship. Carbon is a significant part of organic matter. Because both plants and microorganisms maintain a rather definite carbon:nitrogen ratio, it is important to consider the balance when making an addition of organic matter to improve a soil's condition.

Some manures can have a C:N ratio as high as 100:1, compared with a normal soil ratio in the range of 10:1. When such a manure is added to a soil, general decay organisms become more active. Organisms responsible for nitrification become relatively inactive.

The decay organisms utilize nitrogen and produce carbon dioxide. As a result of the decay organisms demand for nitrate, little is available for uptake by plants.

As decay of the soil additive continues, carbon is lost and nitrogen retained in the tissues of the organisms until a stable C:N ratio is once again achieved.

Nitrifying organisms resume activity as the decay organisms demand for nitrate falls off. Meanwhile, the soil has become richer in both nitrogen and humus.

Duration of the process depends upon conditions which might favor or prolong decay.

Optimum temperature range for decay organisms is between 40 and 50 degrees C. Moisture is

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necessary, but must be balanced against an adequate oxygen supply. Soil reaction should be at a near neutral pH.

If an organic substance to be added is poor in nitrogen content, it may be necessary to supply more nitrogen as a substrate for the decay organisms. Legume tissues are rich in nitrogen, but certain straw residues are poor. In such a case, addition of supplemental ammonium or nitrate will enhance the rate of decomposition.

Nitrogen

Nitrogen is the most widely applied element, yet application is often based on color characteristics, root or shoot growth, or other general indications of less than optimum plant growth. However, nitrogen will not lend as great an effect if other essential nutrients are limited. Growth is generally limited by the contributing factor present to the least degree.

Nitrogen has in the past been recognized as the nutrient required in the greatest amounts, with the exceptions of carbon, hydrogen, and oxygen. Trends have been, however, to reduce the amount of applied nitrogen in relation to the amount of applied potassium. It has been recently suggested that nitrogen be applied on a 1:1 ration basis with potassium. Twenty-some years ago, a 4:1 ration was recommended.

Nitrogen is absorbed from the soil primarily in the nitrate form, although turfgrasses can absorb the ammonia form. The amount of available nitrogen in the soil is usually not a true measure because availability can change rapidly.

Tests are available, however, for nitrates present in plant tissues, and nitrate, ammonia, and organic forms of nitrogen in the soil. It would seem that these tests might be correlated to give an accurate indication of the amount of nitrogen readily available and taken up by the plant.

A large supply of organic nitrogen and a small supply of nitrate and ammoniacal nitrogen would indicate that another factor, beside nitrogen, is limiting its conversion to readily available forms. Supplemental fertilization with a quickly available form of nitrogen could offset these effects while a program to manage the overall soil for better microorganism activity could be instituted.

There are variations due to climate, soil types, testing procedures, etc. The purpose of the above is merely to suggest that an overall picture of nitrogen in the plant and soil would give a definite insight to management techniques.

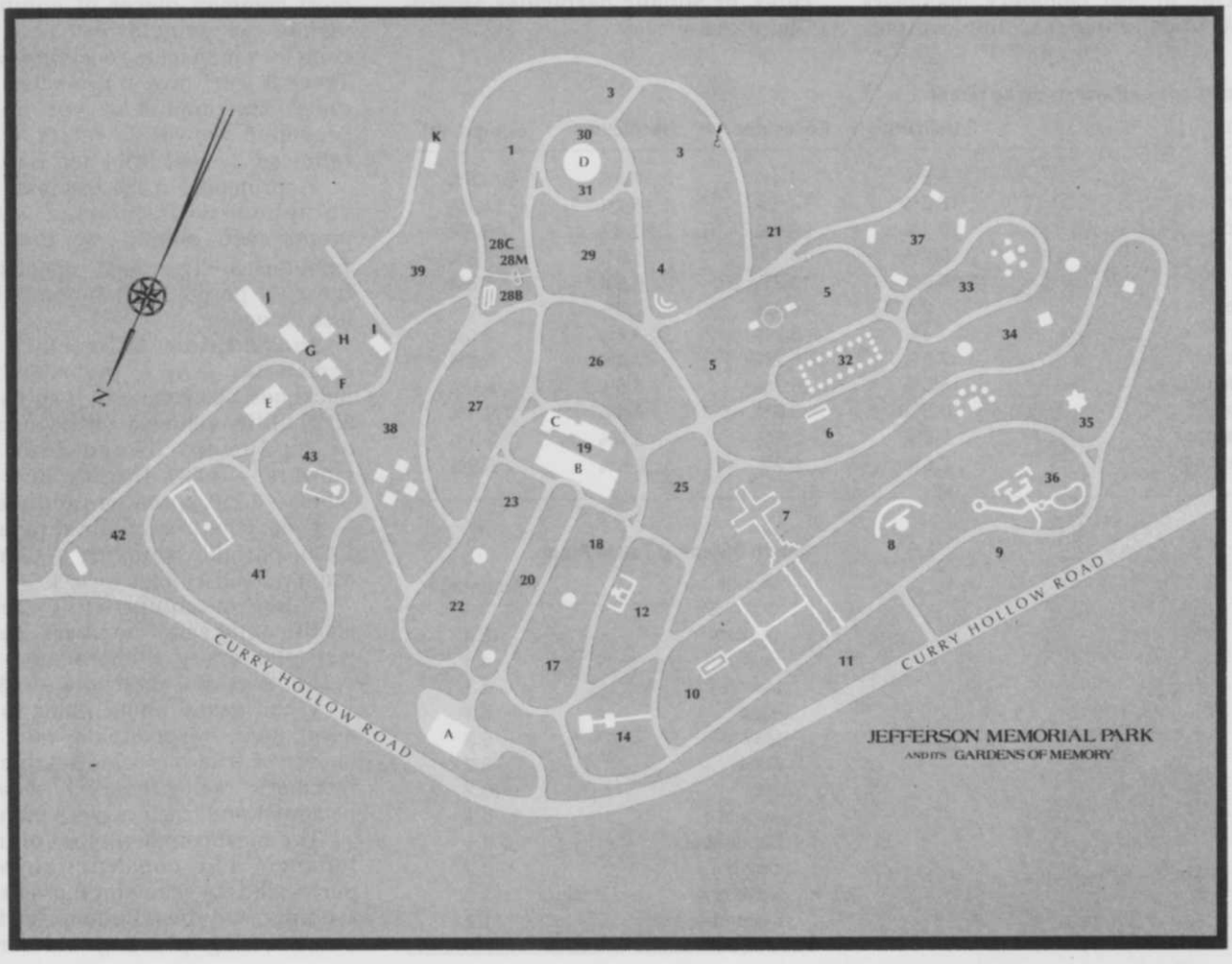
Phosphorus, potassium, sulfur, calcium, iron, magnesium, boron, manganese, copper, zinc, molybdenum, and chloride are essential nutrients. Soil and tissue tests generally provide an accurate indication of the supply of these.

There are also many other soil properties that might be tested for and integrated into a management program. Some properties lend themselves only to an understanding of the productivity of a soil and are not economical to try to change. Soil function and plant growth are dynamic and rapidly change in relationship to their qualities and needs. Understanding them allows a grounds manager to cope with them and satisfy those needs to achieve the goals of a management program. *Ron Morris*

WT&T

PROFILE

CEMETERY AND MEMORIAL PARK MANAGEMENT



CEMETERIES STRIVE HARDER TO CONTROL MAINTENANCE COST

The importance of maintenance costs in cemetery management is increasing steadily, even though less than 25 percent of the cemetery managers polled by Weeds Trees & Turf currently have a separate maintenance budget.

Russell Rager, director of Washington Park Cemetery East of Indianapolis, told 1,200 cemetery mangers at a recent joint meeting of the National Association of Cemeteries and the American Cemetery Association in Chicago, "Only a few cemetery managers are budgeters. Few of them keep an overall budget based upon departmental budgets prepared by subordinates. A cemetery operation should have a sales budget, an administrative budget, and a maintenance budget if it is to achieve its maximum potential in terms of profit."

Out of 990 cemetery managers sent questionnaires, 167 replied. Based upon their returns, larger cemeteries dominated. The average acreage managed by respondents was 98 acres, with 72 acres of developed area. An average of 72.5 percent of the grounds is actively maintained, indicating that more than 25 percent on average is held in reserve.

Full-time staff for maintenance averaged five persons, with three persons part-time and five on a seasonal basis.

Of the 25 percent who keep separate maintenance budgets, the average was $47,600, or $660 per acre maintained ($47,600 divided by 72).

Fertilizer, sod, and trees are the largest non-equipment expenses. Herbicides and insecticides are the next highest non-equipment expenses. Cemetery managers do not use significant amounts of soil fumigants, growth regulators, fungicides, or aquatic herbicides according to the survey.

Percentage of Purchasing by Month.

Month	Fertilizers	Pesticides	Herbicides	Equipment
January	5.5%	4.4%	7.4%	18.8%
February	16.0%	14.1%	16.2%	11.7%
March	20.5%	20.7%	21.3%	18.2%
April	9.5%	14.1%	11.8%	7.8%
May	5.0%	13.3%	6.6%	5.8%
June	2%	10.4%	7.4%	3.9%
July	3%	3.7%	4.4%	2.6%
August	7.5%	5.2%	7.4%	3.2%
September	15.5%	6.7%	6.6%	5.8%
October	10.5%	3.0%	4.4%	9.1%
November	2.5%	2.2%	3.7%	7.1%
December	2.5%	2.2%	2.9%	5.8%

Month Planning Takes Place.

Month	Percentage
January	18.4
February	4.1
March	5.1
April	5.1
May	9.2
June	9.2
July	10.2
August	4.1
September	3.1
October	8.2
November	12.2
December	11.2

The cemetery managers indicated they plan maintenance expenditures from October through January, and in July. They place orders for chemicals mainly from February through April, with a second order in August or September.

Equipment orders are placed earlier, from January through March with another buying period in September through November. The majority of products are purchased from local suppliers, especially equipment.

The average annual seed purchase by the managers was 600 lbs. The seed is used to some extent every month except January, with surges in April, May, September and October. Twenty percent indicated brand or cultivar type, mainly the larger cemetery managers.

Self-propelled mowers are the most common pieces of equipment owned by cemeteries. The 1,250 cemetery managers receiving Weeds Trees & Turf own a projected 4,450 units. The dominant type of self-propelled mower is rotary (3,580), followed by reel (830) and flail (45).

A projected 3,375 tractors, 1,500 equipped with mowing attachments, are owned by the 1,250 cemeteries. The vast majority of these (87 percent) are in the 60 hp or less category.

In addition to tractors, the cemeteries own a projected 1,380 backhoes, 800 front end loaders, and 2,150 utility vehicles. Other numbers of equipment owned are: trim mowers — 4,280, flexible line trimmers — 2,210, spreaders and seeders — 1,900, compressed air sprayers — 1,430, portable spraying systems — 530, and sod cutters — 475.

Types of equipment owned in significantly small numbers are tree transplanters — 10, aerators — 216, verticutters and thatchers — 550.

When asked about plans to buy equipment, respondents said purchases of trim mowers, flexible line trimmers, self-propelled mowers, backhoes and tractors were planned.

The most common types of maintenance and construction work performed by cemetery crews are seeding, sod installation, fertilization, mowing, planting and care of

ornamentals. Jobs performed most often by outside contractors are tree trimming and pest control, and drainage installation.

Some interesting comments made by respondents are:
"We are in the process of turning our herbicide, fungicide, and insecticide work over to a commercial spray firm."
"Survey will make us look like a small market, yet we spend thousands of dollars per year for equipment made for a homeowner or obstruction-free golf course."
"We are forced to construct or adapt equipment to meet our needs."

According to the National Association of Cemeteries, there are 10,000 actively managed cemeteries in the United States. John Neal, president of Jefferson Memorial Park in Pittsburgh and past president of NAC, estimates that roughly 2,000 of the 10,000 are highly maintained. He also pointed out that there are many more small church and town cemeteries not included in the 10,000 figure.

Annual Expenditures

Item	Median	% with Non-Zero Response	Mean	Projection to 1,250 Readers
dry fertilizer	$700	88.1%	$1,150	$1,260,000
post-emergence herbicide	$300	54.1%	$499	$335,000
pre-emergence herbicide	$300	41.1%	$550	$280,000
aquatic herbicide	$100	15.5%		
insecticide	$200	57.7%	$525	$376,000
systemic fungicide	$200	4.8%		
contact fungicide	$100	10.4%		
wetting agents	$50	20.4%		
growth retardants	$200	23.6%	$320	$ 93,600
Soil fumigants		4.8%		
sod	$800	49.5%	$1,624	$997,000
trees	$500	76.5%	$898	$852,000
ornamentals	$500	73.1%	$748	$678,000

Cemetery management is a cost conscious business, yet the cemetery market is a significant part of the Green Industry. Better budgeting practices and an increased interest in plant management can significantly improve the condition of all size cemeteries and perhaps help manufacturers to serve them better. **WTT**

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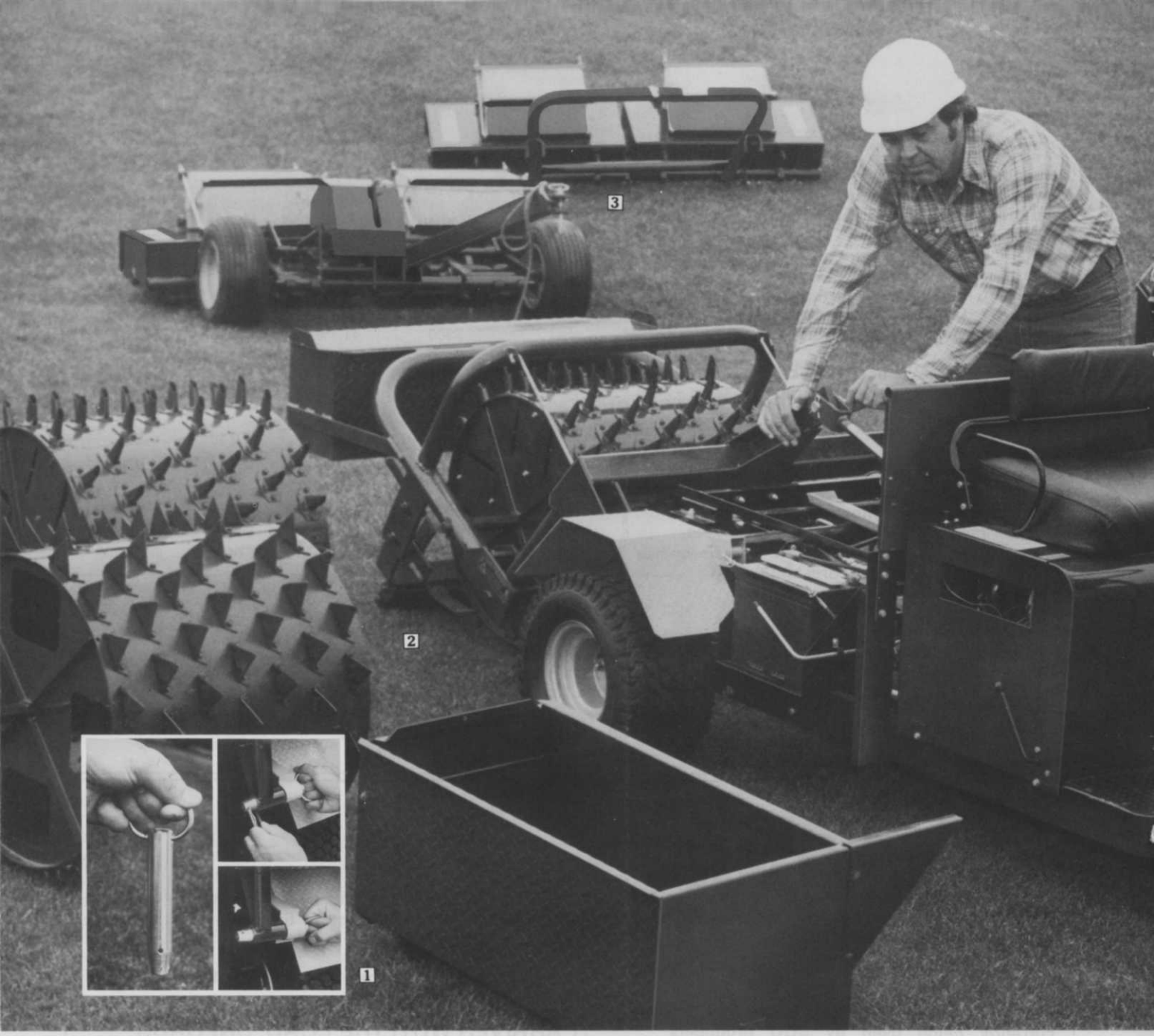

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3 SPIKERS

The Cushman Quick Spiker attaches to a Turf-Truckster with PTO, hydraulic system and dump kit. You spike a precise 57-inch swath, even over undulating ground, and raise or lower the unit hydraulically. The Trailing Spiker gives you the same width and precise results, but its built-in lifting mechanism is controlled by a pull rope.

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5 SPRAYER

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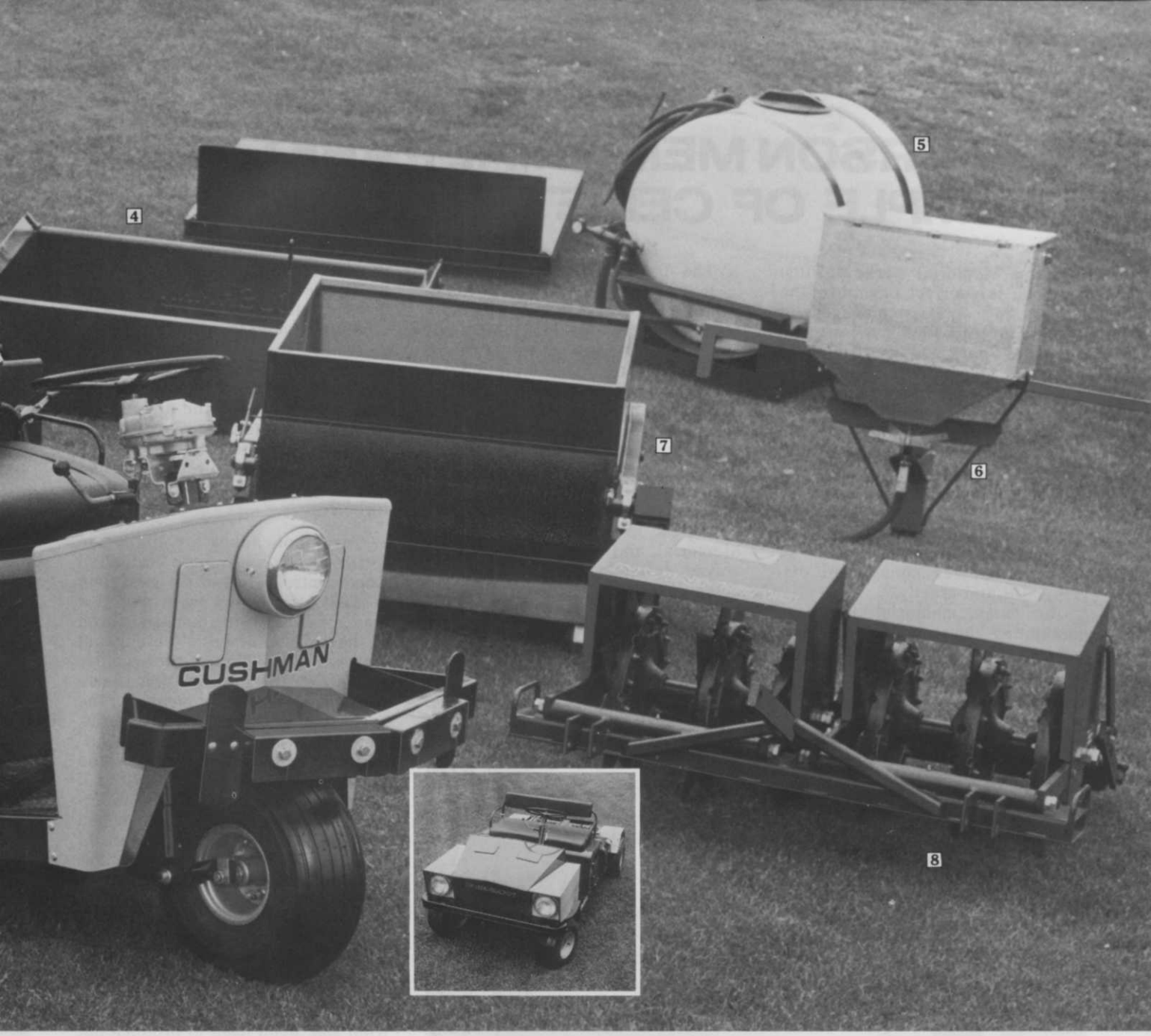
*Rating for vehicle equipped with 9.50-8 rear tires.



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JEFFERSON MEMORIAL PARK: EXAMPLE OF CEMETERY CHANGES

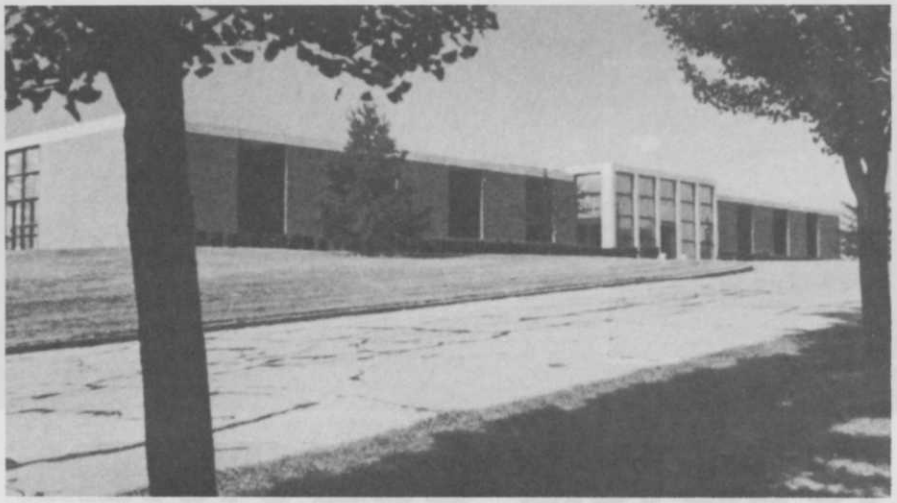
Jefferson Memorial Park in Pittsburgh, Pa. is a perfect example of the changes in cemetery management since the mid-1920's when the memorial park, a profit-making business, started breaking away from traditional cemeteries.

Cemetery managers before that time were chiefly concerned with maintenance of monuments and grounds. They were employed by churches or community boards to provide a respectful and attractive location for burial of local citizens. The concept of pre-need selling of burial sites was considered disrespectful and greedy.

But today, memorial parks are dominating the cemetery business and traditional cemeteries are trying some of their techniques.

The basic differences between memorial parks and traditional cemeteries, explains Jefferson Memorial park President John Neal, are pre-need selling and surface markers instead of monuments. Owners of memorial parks run them as profit making enterprises. They also have made improvements in burial techniques and cemetery maintenance, because they usually handle more interments than traditional cemeteries, more than 100 per month at Jefferson Memorial, and larger acreage is involved. Jefferson Memorial has 150 acres of its 325 developed and requires a staff of 25 to operate and maintain. The maintenance budget alone is nearly $150,000 this year.

"It is like a small city, with 5½ mi. of asphalt roadway, its own drainage and irrigation lines, divided into areas, or gardens, with various religious themes," Neal says. "We have a small greenhouse and nursery. We used to grow our own sod, and we maintain all but the largest trees and all the turf." However, Neal wants his staff to improve its knowledge of turf and tree maintenance and has hired a trained agronomist to assist the general foreman.



The attractive and modern mausoleum (above) rests on a hill on the rolling cemetery. One of many garden pathways (right) lined with ornamentals.

Turf applications are limited to fertilization and some selective weed control. Most of the staff time is spent establishing grass over new graves and repairing damage caused by heavy equipment. "Throughout the year, regardless of the weather or the condition of the turf, you've got to take heavy equipment over the grass to dig graves, install vaults, close the grave and repair the surface," Neal states. "It's terrible on the turf in the spring and fall when it is so wet. Relatives don't understand when a grave's turf is damaged because of the emotional nature of burial. Damage has to be repaired as soon as it happens."

Neal's maintenance staff uses a Reinco hydraulic mulcher to achieve quick cover of new graves. "We got the idea of hydromulching from another cemetery manager in upstate New York," Neal said. "We tried sod, even used to produce our own. We'd buy two trailer truck loads every spring and we'd lose a third of it because of dry weather before we could use it all."

Jefferson Memorial has a wide assortment of cutting equipment. Large rotaries and tractor-drawn gang mowers dominate. Neal sees a problem with equipment designed for the golf course when used for hilly cemeteries. "Small tractors engineered with dual wheels work best on hills," Neal claims. "Flotation tires are fine on level turf but very unstable on wet or snow covered slopes. We also find drive shafts are not built in many cases to take steeper slopes or for turning on an incline. Unfortunately, few manufacturers are making equipment to meet our needs. If they don't engineer the axle for dual wheels,

The lake, bordered with ornamentals, provides a serene natural setting.

chances are you'll tear something up," Neal adds.

"The most important thing when buying equipment is the service. No matter how good the machinery is, if you can't get good service locally, there is no advantage."

Contained in Jefferson Memorial's equipment inventory are two International and one Ford backhoe, two dual-wheel Jacobsen tractor mowers, two dual-wheel Toro tractor mowers, one Kubota tractor with a 60-in. rotary, two Yazoos, one KutKwik, and the gangs. In addition, Neal has a soil shredder, a sod cutter, the hydraulic mulcher, a number of trucks, flexible line trimmers and a Trim Quick, which is similar to flexible line trimmers but uses leather thongs instead of filament line.

Controlling costs is the key to modern cemetery management. Neal is trying a number of ways to control costs, such as using a Burrows L5000 minicomputer to keep track of all aspects of maintenance and sales. Neal plans to get a larger computer in the next four years to further his recordkeeping ability. The computer work and cost control are managed by Neal's son, John II, who is completing his CPA exams this month.

Another measure to control costs is the construction of a vault making plant on the grounds. All graves must contain concrete vaults, and when 1,200 interments take place per year, costs can be cut significantly.

Neal is past president of the National Association of Cemeteries (NAC) and the state cemetery association. "NAC was created when memorial parks started breaking away from traditional cemeteries in the twenties. Then, NAC members were interested in sales more than maintenance. Now, we are finding our maintenance problems to be of equal concern. The traditionalist cemeterians, who are represented mainly by the American Cemetery Association, have always concentrated on maintenance. Now, they are realizing pre-need selling is necessary to remain competitive."

"So the associations are growing closer together. This year the first joint meeting of the NAC and the ACA was held in Chicago. There is considerable discussion and hope that the two associations will merge sometime in the future."

"The cemetery industry is not too well understood and is often overlooked by manufacturers. There are at least 10,000 actively managed cemeteries in the United States. So, we are a significant group," Neal states.

The need for proper grounds care is combined with the need for controlling costs in today's cemeteries. Jefferson Memorial stands as a model for others to copy in the effort to balance the two. **WTT**

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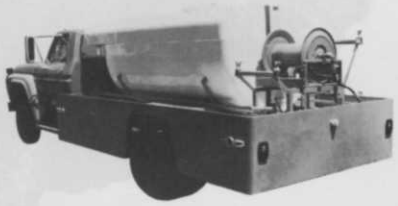

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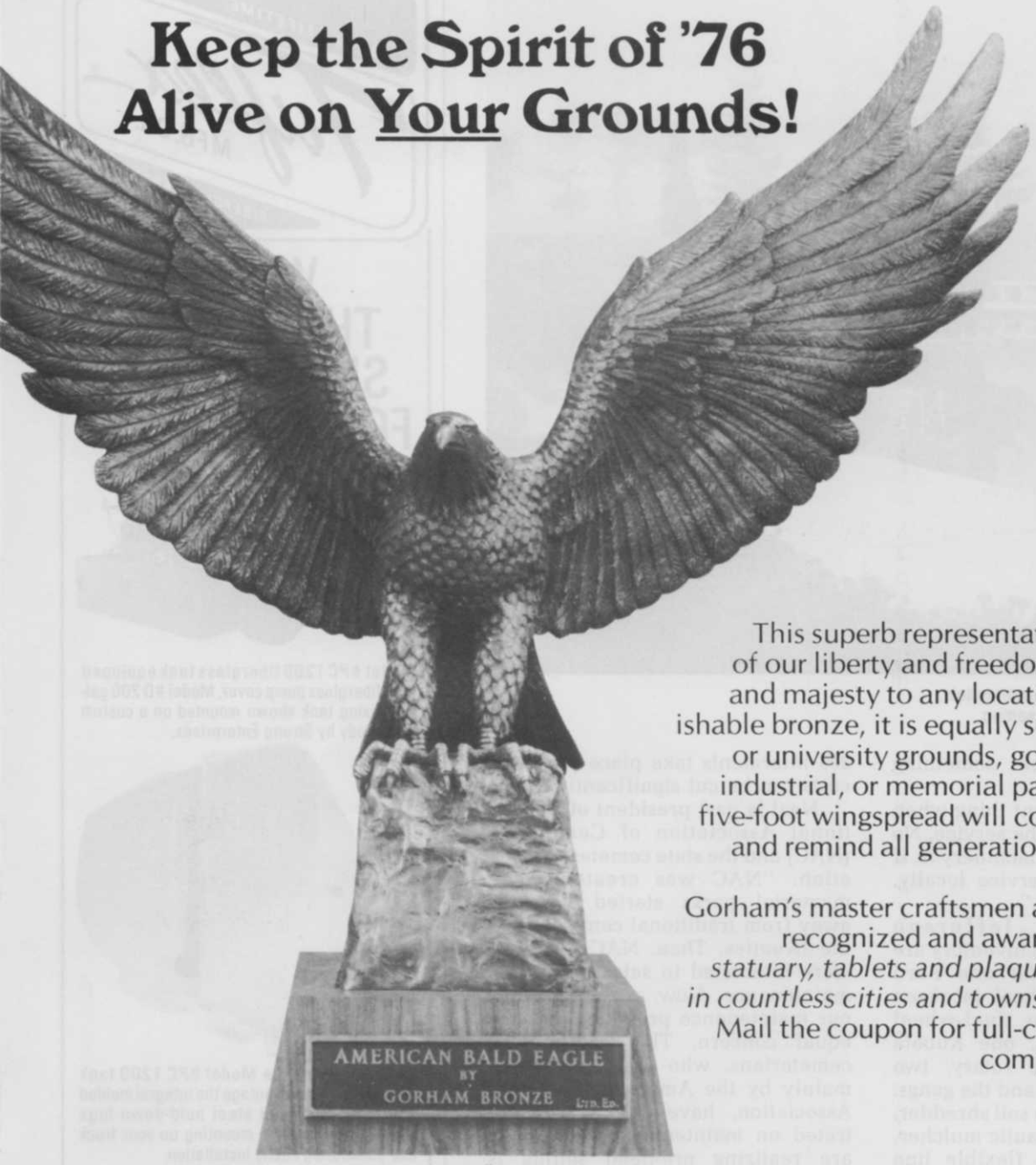

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LANDSCAPE FORUM

CONTRACTORS, ARCHITECTS, NURSERYMEN DISCUSS JOB ESTIMATING

In the July 1978 issue of Weeds Trees & Turf we looked into some of the more critical areas of friction between landscape contractors and landscape architects. This month we've added a third party to the relationship, the nurseryman.

Lake County Ohio is an area east of Cleveland famous for its large nurseries. In this area members of the American Society of Landscape Architects, the Associated Landscape Contractors of America, the Lake County Nurserymen's Association, and the Ohio Landscape Contractors' Association, met in October for a panel discussion on estimating landscape construction.

Two men from each association participated in the panel moderated by this editor. Discussion covered the areas of installation out of season, availability of plant material after two hard winters and some streamlining by nurserymen. Remarks made by panel members and persons in the audience may have value to all landscape contractors, landscape architects and nurserymen.

Out of season installation

Severe winters, late springs, and wet autumns the past two years have placed unusual limits on digging and planting times. Growers are under great pressure to dig during shorter springs and contractors find optimum planting time reduced to weeks. Occupancy regulations requiring landscape completion are forcing contractors to install and the growers to dig under less than optimum conditions, often in the summer. All these factors result in higher prices, the need for alternative plant material in specifications, and increased reliance on container material.

Tom Hill, T.W. Hill Co., Landscape Architect, Parma Heights, Ohio

"For summer installation, you have to be conscious of the need for irrigation and the availability of water at the job site. Provision in the specifications for the added cost of tanking water to newly planted or sodded areas is necessary in some instances.

"In the winter, you have more breakdowns in equipment and personnel. Efficiency drops. Handling earth, excavation, and drainage are all worsened. Things to watch for are replacing the soil and properly compacting it, and protection by mulching and complete wrapping to get the plant material through to spring.

"We maintain a cost data file and therefore can refer to costs of past jobs that are similar. Basically, the LA knows the catalog price for a given size of a given plant. From his file he finds bids from contractors on a similar material, so he can figure the markup.

"We all use a multiplier factor in estimating. This can work for or against contractors. A multiplier for a decidious job results in overpricing of material. A multiplier on evergreen jobs results in underpricing. If we had a cost factor based upon ball size, we would have a more rational basis of planning costs."

Mike Deeter, Thomas H. Bonnell & Assoc., Landscape Architects, North Canton, Ohio

"We try to stress to clients that certain times of the year are best for particular planting. If the client wants to do planting out of recommended seasons, we notify him of problems involved. We also inform him that some type of maintenance program is necessary by the contractor at additional expense or the client will have to assume the burden of loss himself.

"As for estimating, we as an office don't consider any additional amount for out of season work. Granted there are more difficulties out of season, but we estimate it as a factor (two to three) times the wholesaler's price. If a client is not equipped to maintain a certain planting, we build it into the contract so that the contractor has 60 to 90 days to care for the material after installation."

Bill Hendricks, Lake County Nursery, Perry, Ohio

"Containerization has really changed the availability of plant material. This has made plant materials and the use of summer or out of season installation a big factor in the nursery and contractor industries. The only problem with containerized plants is that the plant material is not of the size landscape architects would like to see. Maybe a certain degree of change in sizes should be looked at for out of season installation. Much has been done, such as wilt proofing with summer digging, but it means additional cost."

Gail Ruckel, Warner Nursery, Willoughby Hills

"I think that almost any plant can be planted if it is dug at the right time. If a plant is dug out of dormancy, the price doubles. You can wilt proof, put it inside and under permanent mist. If the plant isn't dug at the proper time, it's going to cause problems all the way down the line. If the planting was not bid for out of season installation, I don't think contractors can afford to do it out of season."

Peter Knight, Knight & Staller Landscape Architects, Shaker Heights, Ohio (in audience)

"If the nurseryman is notified in advance of an August planting so that you can dig in the spring, is summer planting feasible?"

Bill Hendricks

"Any spring that I've ever been through is still 60 days short of what we need. How we can get August digging done when we can't get our April and May digging done, is a mystery to me."

Ed Connelly, Connelly Landscaping Co., Avon

"We buy extra material and ask if we can make substitutions. When we buy material in the spring we immediately chip it in. If it roots in the chips, we question whether or not to move it in August even though money is tied up on the job. We will wilt proof and move them most likely rather than tie up the money.

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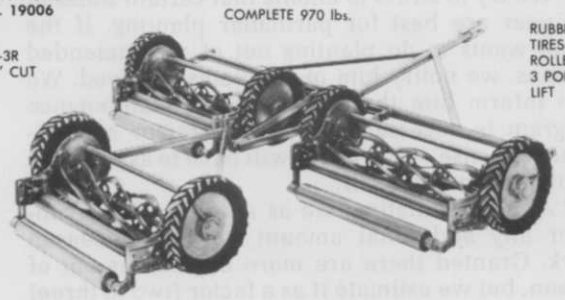

MOWER MODEL	CUT	3 GANG CUT	5 GANG CUT	UNIT WEIGHT	3 POINT LIFT	CATAGORY
MR21-1W	21"	60"	96"	80 lb.	MR21-3F	0
100A-1G	25"	72"	118"	110 lb.	100A-3F	1
GC	30"	84"	138"	280 lb.	GF-3F	1

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"Often after the first frost, architects will call for an installation date within the week, when we aren't even on the nursery's schedule yet. To explain it is another 30 or 60 days away is very difficult. We try to cover this during our initial meetings with the client.

"We can't operate in just spring and fall, we've got a twelve month payroll to meet. We have a pretty good thing in containers. As far as the B&B trees go, the cost must go up to cover extra precautions."

Nick Panagopoulas, R.B. Stout Landscaping, Akron, Ohio

"We generally don't consider out of season while pricing since it's also hard to believe dates for installation in contracts. I bid the job the way it takes to get the job."

Dennis DiSanto, The DiSanto Companies, Cleveland, Ohio

"I think installation out of season is beneficial to all of us. We may not want to do it, but if we look at nine out of ten specs that are submitted to us by architects, they give dates. We know when a client comes to us and wants to open July 27, which means the landscaping must be in then, we are going to do everything in our power to have that landscaping in. This August we probably did more landscape installation than we have done in quite a few months.

"We have to adjust our thinking to please the client, but it has got to start with the landscape architect. There should be adjustment in pricing for summer installation, some variance in the guarantee, and some flexibility of plant material to be used.

"Handling material dug in the spring and planted in the summer is tricky since the plant is disturbed twice. Also, the major cause of plant failure is improper drainage, not out-of-season planting."

Harold Kuznick, Petite Fleur Landscaping, Cleveland

"Our major problem has been with the general contractor not having the site prepared at the right time. Often the contractor will say he'll have the site ready for you in two days, and when you have the plant material delivered it's not ready."

Ed Losely, Herman Losely & Sons Nursery, Perry, Ohio (in audience)

"All three segments of the market are not professional enough to be the experts and tell the public that this is the time to do the work. When you say you can't do it, there is always some guy in the bushes who will do it in July. You should also consider, we lose alot of material sitting undisturbed in the nursery."

Availability of plant material

What architects would like to have and what nurserymen can provide at a reasonable cost often conflict. Nurserymen face higher taxes, labor problems, and unpredictable digging periods.

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What appears in nursery catalogs may not be there when installation is held up by general contractors, or at least not at the same price. The contractor faces transportation charges if local nurseries run out of desired plant material. Finally, alternative plant material and sizes help the nurseryman deal with out of season demand. Slower growing specimen material is becoming uneconomical from the grower's standpoint since it ties up valuable space in the nursery.

Bill Hendricks

"The architect often does the design three to eighteen months in advance from catalogs. We publish a catalog for the purpose of selling out our stock and we often do. That should be understood by architects and contractors.

"Substitution has a bad connotation. The word alternative means the same thing but seems much more acceptable to clients.

"We're plant factories anymore. If we plant 1,000, we want to harvest 999. Labor won't let us overplant. Because we are plant factories, what is available is limited. Those big four and five inch trees that architects love to work with are too expensive for us to grow. You have to start considering what we can grow for you. Insistence on large specimen plants will result in pricing your clients out of the market.

"Containers are taking over, but they are not giving you all the sizes you want. B&B materials and the problems they present often result in smaller sizes and alternatives."

"We can't afford to tie up the land for slow growing material. We can't afford to buy an extra 50 acres to let it set."

Gail Ruckel

"The demand for plants, especially larger size plants is tremendous. We can't grow enough for all the needs. You can't go by catalogs entirely.

"Architects should check the roots more than the caliper. Also, certain plants are better in containers than B&B, such as pyracantha and some of the hollies. When people check the catalog for availability, and then wait two months and ask for an odd ball type of plant, they will have a hard time finding it at the right size."

Ed Connelly

"We are trying to inventory plants in order to have them when we need them. It's a real hassle and it's not the best for the plant nor is it the most profitable. I try to estimate what the demand is going to be and then buy certain plants, like crabapples. However, we are not nurserymen.

"I still like to see specimen plants. Some nurseries still try to provide them. Maybe size limita-

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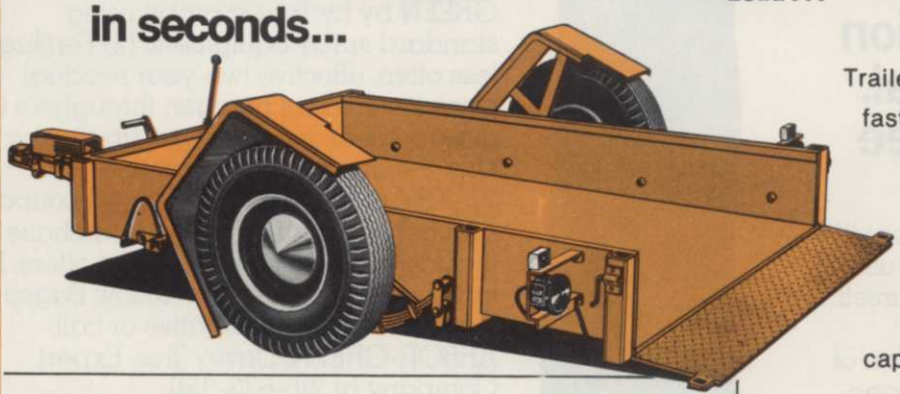

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tions for specimen plants may help the nurseryman meet the demand profitably. And if architects specify a real specimen plant, they should be ready to help the contractor find it."

Nick Panagopoulas

"I think it's up to the nurseryman to select the specimen plant for the contractor and not try to shove off some bad material on him."

Dennis DiSanto

"The architects today in doing what they consider a good job for the client are requesting larger specimen plants. The client should have an alternative. I think eventually the cost of larger plant material, the securing of it, and the cost of transportation are going to price the project completely out of the client's desired budget.

"We lost a nice job this spring because we bid according to specifications. They required 500 nine to ten ft. tallhedge. We searched the country and found them in Connecticut, and we bid them. We lost the job because another fellow said he couldn't find them and bid on smaller plants from a local nursery. The cost of transportation was nearly as much as the price of the material locally. We should have offered a bid on the specified job, and an alternative bid. Maybe it would behoove the architect to give the client as well as the contractor an alternative."

Ed Losely in audience

"The nurseryman has to meet prices of nurseries that didn't get hit as hard by the last two winters. The same plant may react differently in different winters. I think it may be because of seed source. Seed can come from almost anywhere. For northern Ohio seed should be collected from a northern source. Different seed lots come from different places in different years. You are never really sure that the seed is from a northern enough source to provide the desired winter hardiness."

Mike Deeter

"When we first determine what we need in the way of plant material, we start calling contractors and nurserymen and review bid forms from past jobs. The architect has to make the phone calls.

We contact state extension for information on winter kill and the success of certain plants in the area. The resources are out there. Availability of certain types of plants material is really the responsibility of the landscape architect." **WTT**

Reported by Bruce Shank, editor.

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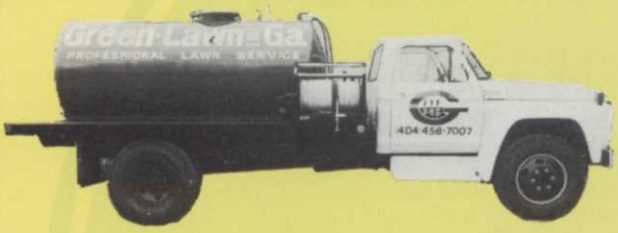

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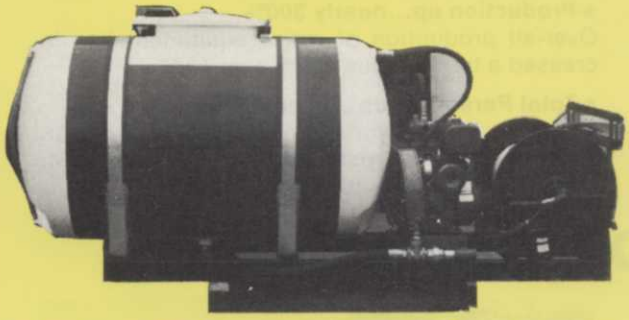

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Industry News

Coated Seed from page 10

To be distributed under the name "Prill-On," the company lists advantages of the new coated seed as improved germination (especially under dry conditions), healthier establishment due to nutrient impregnation, increased protection against fertilizer burn, insects and birds and easier application.

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RESEARCH

Texas' Beard studies oil spills on turf

Detergent proved most effective in enhancing bermudagrass recovery from motor oil, hydraulic fluid and brake fluid damage in a recent study of oil spills on turf conducted by Texas Agricultural Experiment Station turf researcher Dr. James Beard.

Petroleum spill damage on bermudagrass was studied to determine injury symptoms and subsequent recovery rates.

Five petroleum products commonly used in lawn maintenance equipment were applied and injury symptoms noted for gasoline, motor oil, hydraulic fluid, brake fluid and grease spills. Calcined fine clays (kitty litter), activated charcoal and detergent were applied within 20 minutes of each spill and evaluated as corrective agents.

Detergent improved recovery time about half as much as the eight to 10 weeks recovery time noted without corrective measures. None of the corrective treatments were effective on either the gasoline or grease-damaged turf. If petroleum spill is of high volume, turf and soil may need to be replaced.

Ohio Turfgrass Foundation President John Fitzgerald (r) recently presented the 1978 research donation of $16,500 to Ohio State University Associate Dean Ken Reisch (c) while Dr. Dave Martin, O.S.U. Extension Agronomist in Turf and OTF Executive Secretary, looks on. The $16,500 donation will be used for turfgrass research in Agronomy, Entomology, and Plant Pathology and brings OTF research donations to more than $170,000 since 1968.

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FLCRA from page 8

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Imprinter from page 10

collected data as of yet. Native grasses and shrubs have been planted on heavy clay topsoil, sandy soil and loamy soil, according to John Blueyez, director of experimental reclamation programs.

The land imprinter consists of two steel cylinders, each 40 inches long and 40 inches in diameter, with 6-inch angle irons welded to the surface. The imprint cylinders are available in a number of geometric patterns.

One cylinder forms a seedbed for grasses while the other forms trenches for water runoff, directed into the seedbeds. Depth of the trenches can be varied by filling the cylinders with water or other fluids.

The AEI concept indicates that water infiltration is controlled by the microroughness and macroporosity of the soil surface through a complex interaction of many physical, biological, pneumatic, and hydraulic processes. Hand treatments on soil surfaces have been successful and are similar to those pproduced by the land imprinter. The imprinter is expected to produce an infiltration range similar to the hand-imposed treatments used in validating the AEI concept.

The imprinter, which requires a tractor 30-hp or more, can roll over brush up to 3-inches in diameter, and can effectively crush and chop the vegetative material, creating a mulching effect. This also serves to kill the vegetation, conserving water for grass establishment.

For more information, contact Dr. Robert M. Dixon, Soil Scientist, Southwest Rangeland Watershed Research Center, 442 E. 7th St., Tucson, AZ, 85705.

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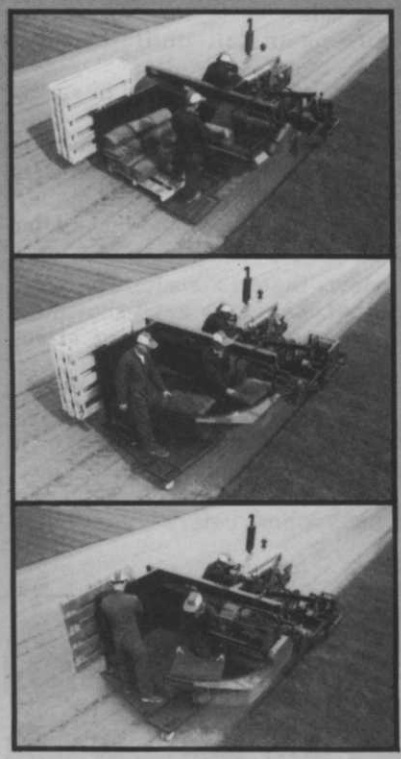

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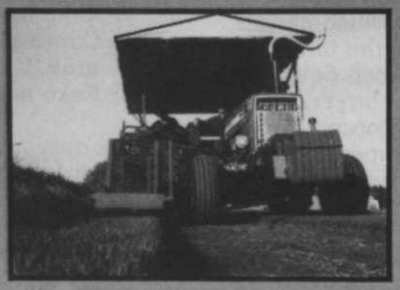
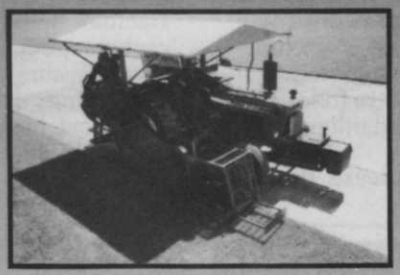


- No waste, cuts to fences, ditches, irrigation pipes.



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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *Last winter many of our lawns were covered with snow mold. What is the best fungicide to apply, when should it be applied and at what rate?*

A: The two most common snow molds are Fusarium blight (pink snow mold), which causes small, circular patches to develop in the turf, and Typhula blight (gray snow mold), which develops only under snow cover and produces larger, more irregular patches. Snow molds readily occur during periods of high humidity and air temperatures of 32° to 45° F. Snow falling on unfrozen ground provides ideal conditions for disease development.

A combination of fungicides will give the best results, and there are several labeled for either or both of the snow molds. We have found an application of Tersan 1991 plus Tersan SP about mid-November (before snow cover) gives good results. Of course, another application in midwinter will increase the protection, but this is not often practiced because of the expense and the uncertainty of a sufficient thaw for a treatment. Always follow the manufacturer's directions for rate and other information.

Cultural practices can help decrease the incidence and severity of snow mold and should be considered where snow mold is a problem.

1) Remove excess thatch
2) Avoid succulent turfgrass growth in late fall
3) Rake leaves in fall
4) Continue mowing in fall until turfgrass growth ceases
5) Rake matted patches of snow mold in spring

Q: *We own a golf course in southeastern Iowa. Our problem is crabgrass. What is the best product(s) to use and at what time of year? Time and money are extremely important as my wife and I do all the work ourselves.*

A: I checked with Iowa State Extension Horticulture and was told that their tests have shown no significant difference between the cost or effectiveness of Balan (available only as a granule) and Dacthal. Both products must be applied before the crabgrass seeds germinate which, in southeastern Iowa, occurs about the second week in April, depending upon climatic variations. The best biological indicator in your area is lilac and the materials should be applied before the earliest lilac blooms.

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Nobody offers you more ways to increase productivity and reduce land improvement expenses than Vermeer.

Vermeer Tree Spades. Patented tree-moving/tree-packaging machines that automatically dig, ball, transport and replant shrubs and trees up to 25 ft. in height. Tractor-mounted, trailer-mounted, or truck-mounted units—plus complete multi-purpose landscaping machines that handle a tremendous assortment of dirt-handling functions in addition to transplanting trees.

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Q: *Roundup is a systemic herbicide that is translocated to the root system after leaf application and absorption.*

1) Is it absorbed by any green tissue?
2) What, exactly, happens in the roots?
3) How persistent is it in a plant exposed to it but not killed?

A: 1) Roundup is absorbed by any green tissue although green bark would absorb less material than green leaves. The Roundup label states DO NOT SPRAY GREEN BARK.

2) Roundup (glyphosate) inhibits aromatic amino acid synthesis.

3) Roundup can overwinter in plant tissues and cause injury symptoms to appear the following year, depending upon the applied concentration and target species.

Q: *Is there any safe method to root prune maple trees that are continually upheaving sidewalks?*

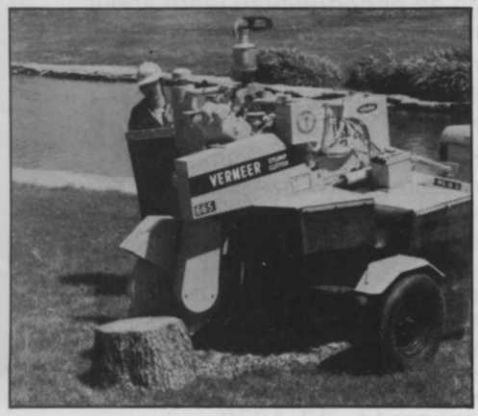
A: Maples are notorious for the upheaval of sidewalks because of surface rooting. Roots can be selectively pruned without causing noticeable injury if only a few roots are removed per season. You should use careful judgement when considering the removal of large roots. Crown thinning will help re-establish the equilibrium between the roots and shoots and minimize injury. Proper fertilization and watering are also beneficial.

To help prevent a recurrence of the problem, deeper rooting can be encouraged by improving water drainage and air penetration into the soil.

Q: *What is the best method of controlling bermudagrass while trying to establish zoysiagrass?*

A: The best method is to treat the area with methyl bromide prior to planting zoysiagrass, but because of the hazards involved, I would not recommend it. The most *practical* control is an application of Roundup prior to planting zoysiagrass and periodic spot application as needed until the zoysiagrass completely fills in the area. Roundup is nonselective and will kill both bermudagrass and zoysiagrass in the applied area. I am not aware of any material that will selectively control bermudagrass without also harming the zoysiagrass.

BIG SAVER



Vermeer Stump Cutters. Fastest, easiest, most economical method of removing tree stumps. With four powerful machines, each equipped with a big hydraulically controlled cutting wheel that actually chews even large stumps to chips 6-24 in. below the surface . . . in minutes!

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THE DIGGIN' UTCHMAN

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PROSCAPE

By Michael Hurdzan, Ph.D., golf course designer and consultant

Q. *I am planning some new construction that will cause fill to be placed over some tree roots. What precautions should I take to protect these trees?*

A. First, consider the tree's size, age, vigor, species and location, and whether it is economically worth saving at all. Once the decision has been made to save the tree, then limit the fill over the rootzone within the dripline of the tree (where 75% of the roots occur) to 6 in. or less of good topsoil. This small amount of fill will not usually inhibit water or air movement to the roots.

Paramount in protecting a tree is to provide near normal air exchange to tree roots. If the fill is to exceed 6 in. but not more than 12 in., add 6 in. of coarse gravel over the original grade capped with 6 in. of good topsoil. If the fill is more than 12 in. but not to exceed 24 in., then cover original grade with 6-12 in. of coarse gravel capped with topsoil and build a well around the trunk that is about three feet from the trunk on all sides and extends down to the original grade. If fill will exceed 24 in., then the well should be made, drain tile installed, coarse gravel blanket used, and capped with topsoil.

During construction, even where no grade change is scheduled, damage can occur to trees by soil compaction, harmful chemicals or solutions, wounds or fires. To prevent such damage restrict or confine traffic in wooded areas, prevent storage of harmful materials or supplies in the vicinity of desirable trees.

Many designers require that fences or barricades be erected around trees or groups of trees that cover at least a 20-25 ft. area. When removed trees and debris are to be burned, thought must be given to locate and confine burning to areas so heat, smoke and ashes do not injure remaining plants. Also, burning areas should be constantly tended and there should be access to fire fighting vehicles if an accident occurs.

Another consideration during construction in wooded areas is how will the construction effect the micro-environment of that site and what will subsequently effect the remaining plants. Removal of large numbers of trees exposes other trees to increased amounts of sunlight, wind, drier soils perhaps, etc. These anticipated effects could influence the choice of species, size, age, and vigor of vegetation to remain. Such decisions may require the expertise of an arborist, forester, horticulturist, or nurseryman.

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Jobe's Tree and Shrub Spikes help Jack Lynn make money in the off-season. They extend his business well into winter, when crews would otherwise be idle. Lynn adds, "Jobe's Spikes take the guesswork out of feeding trees and shrubs. We wouldn't use anything else."

Jobe's Spikes build profits from the ground up.

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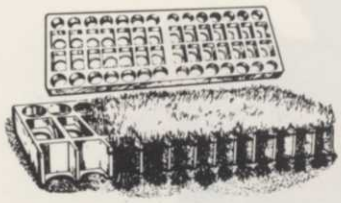
PRODUCTS



Poly Forms, a division of Presto Products, has introduced Sod-Saver, a landscaping block designed for turf maintenance. The blocks, made of heavy-duty molded plastic that is resistant to water, acid, heat, and extreme cold, is are loakbearing and allow the growth of healthy grassroots.

For use wherever heavy pedestrian and vehicle traffic is a problem, Sod-Saver blocks have the potential of providing new surfaces for golf course and park areas, for overflow parking, for service vehicle admittance for industrial and municipal buildings, and for airplane parking.

The blocks are available with solid cell centers for use in paving or as a temporary roadway. Blocks are 36" x 12" and are available 1-⅜" thick for normal use and 2-¾" thick for heavy duty use.

Circle 701 on free information card

"Sound Conditioned" M & M Brush Chippers for... less noise... more efficiency

Applying engineering designs which "Sound Conditioned"* our industrial scrap reduction machinery, Mitts & Merrill can modify our brush chippers for low noise levels. At the same time, those engineering features which have made Mitts & Merrill the leader for years have been retained.

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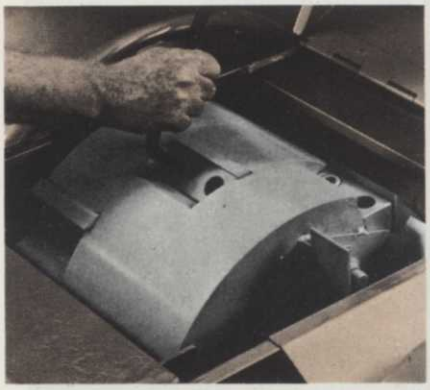
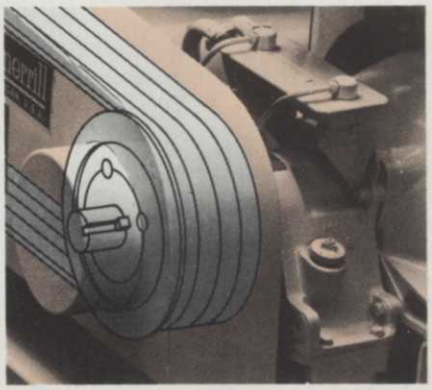


Staggered knife pattern, for years a Mitts & Merrill feature, has always resulted in a lower noise level. First, by segmenting the noise source. Second, through smoother cutting action. Third, by producing smaller chips.



Optional torque converters and the heaviest steel cylinder — even without an external flywheel — combine to give positive cutting action under the most rugged conditions. Isolates the engine from shock. Minimizes maintenance.

Plus • **Positive safety-lock pin** for greater operator safety • **Swing-away, folding feed chute** protects cutting chamber; allows instant access and increases maneuverability • **Heavy duty construction** includes coil spring, torsion-type suspension, and box tubular steel frame.

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Circle **109** on free information card

Westheffer Turf Division announces a new 300 gallon lawn and tree care spray unit. The unit is completely self-contained and is mounted on a heavy duty pipe skid for ease of loading and unloading. Standard equipment includes a 300 gallon stainless steel tank, electric start 7 h.p. gasoline engine, 10 g.p.m. pump, belt drive reel, and mechanical agitation system. Designed primarily for lawn care operators, the unit will also reach trees and shrubbery to heights of 25 feet.

Circle 702 on free information card

Leisure & Specialty Cab Sales have introduced a Specialty Cab, manufactured with the roll bar concept, for the compact sized farm and garden tractors. The cabs are axle mounted and easy to align for quick

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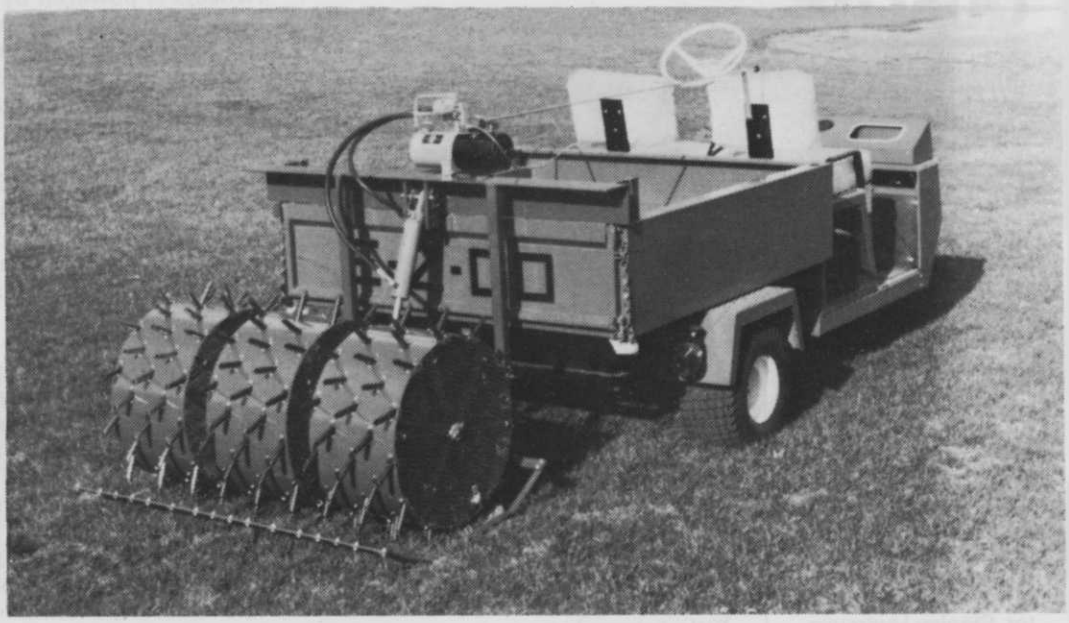

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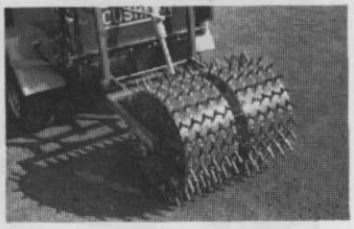

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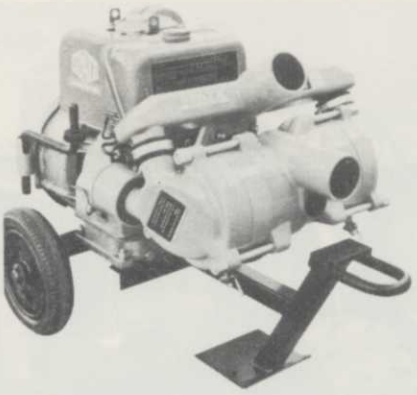

Model DS-3 Spate 3" double acting diaphragm-type water pump from Desco Diesel Energy Systems handles sludge, sand, silt, slurries, viscous liquids and other problem fluids through delivery hoses with little internal wear.

Model DS-3 is compact, lightweight, easily portable and pumps air to 70 psi at approximately 8 cfm, pumps 1700 gallons/hour of water at 100 ft. head and 25 ft. suction, has 29 ft. maximum suction lift without need for a foot valve, and automatically reprimes itself in seconds. Its ability to pump through practically any length of suction and delivery hoses make the new Spate 3" pump a versatile, dependable unit for trench dewatering, industrial desludging, fire fighting, underwater pressure jetting and many other difficult applications. The quick-priming feature also allows it to operate efficiently in an automatic on and off mode for control of seepage.

Model DS-3's patented inertia flow principle enables the Spate Pump to displace two and a half times the actual swept volume of the cylinders at low internal speeds. This delivers high pressure while preventing excessive internal wear on the die cast aluminum/silicon alloy structure, which is also said to be highly resistant to corrosion from sea water.

Circle 704 on free information card

The Nickerson Turfmaster 2001, British-designed and built, is a 3-wheel tractor with a 72-inch triple rotary cutter. Each of the three

wheels is powered by a high-torque hydraulic motor inside the hub, and the system also drives the cutting unit and implement lift sysmte. The Turfmaster can turn completely within its own length.

The 2001's 4-cylinder, water-cooled engine provides power for climbing and traverse cutting 60° slopes. The mower can cut up to 30 acres a day on a single tank of gas. It also has a high transport speed between sites.

Acceleration and braking are controlled by a single foot-pedal while the steering, through a single column, is powerassisted and controls are arranged at the driver's fingertips.

No clutch, universal joints, or friction wheel brakes, together with design strengths should allow the Turfmaster to withstand prolonged use with low maintenance.

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Life-Time Products offers a unique elevating platform trailer capable of hauling two tons of cargo over the highway. The platform hydraulically lowers completely to the ground or can be raised up to 40" to accommodate most truck and dock heights. The bed maintains a level plane when raised and lowered, avoiding load damage due to cargo shift. This all purpose trailer is designed for one-man loading and unloading of heavy items that would normally require costly lifting equipment or more man-power.

The trailer is furnished with standard equipment such as battery operated hydraulic pump, electric brakes. DOT lights and reflectors, safety chains and ball type hitch for over the highway use.

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Tree Surgery, A Complete Guide, gives an up-to-date account of modern tree surgery operations. The theory behind acquiring the skills and knowledge necessary to perform competent tree surgery is outlined clearly and precisely.
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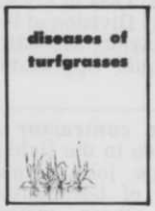

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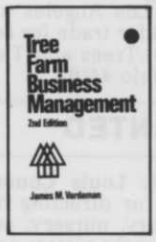

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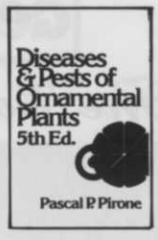

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WANTED: Landscape contractor or someone with experience in the field of implementing landscape jobs. Should have some knowledge of horticultural practice, superivising others, maintenance of landscape equipment, etc. Salary open depending on experience and education. Environment, Inc., P.O. Box 6286, Mobile, Alabama 36606.

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AERIAL BASKETS, digger-derricks, stump cutter, brush chipper and Prentice loader. 414 354-8730. Allied Enterprises, 9102 N. 75th St., Milwaukee, Wisc. 53223.

1. 2½ TON WENCH TRUCK; 2. 2-ton dump truck and chipper; 3. GMC 1-ton spray truck with 300 gallon sprayer on back; 4. 1-ton flatbed truck; 5. saw and equipment, including woodsplitter; 6. office furniture. Mine is the oldest and best known tree service company in Conroe in Huntsbille, Walker County and surrounding counties. I gross approximately $100,000.00 per year, with a four-man crew. I must sell due to ill-health. Only those interested, please call Maxie's Professional Tree Service of Conroe, Texas, 713 756-5888, or write P.O. Box 1218, Conroe, Texas 77301.

FOR SALE: Two Roseman 7 unit hydragang mowers. One unit used one season, the second two seasons. Both units equipped with 6 blade reels and new bed knives. Overall both are in excellent condition. Asking $3,500.00 each. Emerald Turfgrass Farms, Inc., Sumner, Wa. 98390. 206 863-1003.

NEW 10000 gallon Hanson fiberglass tank with baffle and mechanical agitation, mounted on a skid. Ideal set up for liquid spraying. Birmingham Lawn Spraying Co., 20784 Osmus, Farmington, Mich. Phone 313 478-7140.

1974 VERMEER TS 44A trailer mount tree spade. Excellent condition, used two weeks since 1976. $7,000.00. William Stewart, P.O. Box 241, Snow Hill, MD. 301 632-1126 after 6 p.m.

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SOD QUALITY Seeds: Adelphi, Glade, Cheri, Nugget, Merion, Fylking, Majestic, Baron & Touchdown bluegrasses, also fine fescues. Manhattan ryegrass. Custom mixing available. Michigan State Seed, Grand Ledge, Michigan 48837. Phone 517 627-2164.

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USED CHIPPERS, skyworkers. Arlo

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The Goodall Fillies

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EVENTS

cranes and hydro-ax's. Please call P. C. Gould Sales Company, Box 178, Essex, Conn. 06426. 203 767-1636, Phil or Jeff Gould.

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California Landscape Contractors Association Annual Convention, Hyatt Lake Tahoe Hotel, Lake Tahoe, Nev., **Nov. 19-21.** Contact: Mike Leeson, CLCA, 6252 E. Telegraph Road, Los Angeles, Calif., 90040, phone: 213/728-2522.

New Jersey Turfgrass Expo '78, Cherry Hill Hyatt House, New Brunswick, N.J. **Nov. 28-Dec. 1.** Contact: Dr. Henry Indyk, Cook College, Rutgers University, P.O. Box 231, New Brunswick, N.J., 08903, phone: 201/932-9453.

ALCA Maintenance Symposium, San Jose Hyatt House, San Jose, Calif., **Nov. 29-Dec. 1.** Call: 703/893-5440.

Minnesota Nurserymen's Association 53rd Annual Convention, Thunderbird Motel, Bloomington, MN, **Dec. 3-5.** Contact: MNA, 2240 Midland Grove Road, Suite 108, St. Paul, MN 55113.

Delaware Turfgrass Conference, Hercules Country Club, Wilmington, DE, **Dec. 4.** Contact: Dr. Wm. Mitchell, Ag. Bldg., U. of Del., Newark, DE, 19711.

National Fertilizer Solutions Association, 24th Annual Convention and Chemical/Equipment Exhibition, Georgia World Congress Center, Atlanta, Georgia, **Dec. 4-7.** Call: 309/691-2870.

The Irrigation Association Short Course Program, Turf Irrigation, San Francisco, Calif., **Dec. 5-7.** Call: 301/871-1200.

Ohio Turfgrass Conference and Show, Columbus, Ohio, **Dec. 5-7.** Ohio Turfgrass Foundation, 1827 Neil Avenue, Columbus, Ohio, 43210.

GCSAA Fall Seminar, Leadership, Motivation, and Employee Relations, Hyannis, MA, **Dec. 6-7.** Call: 913/841-2240.

Texas Turfgrass Association Annual Conference and Trade Show, Rudder Ctr., Texas A&M University, **Dec. 11-13.** Contact: Executive Director, P.O. Box 8053, Dallas, TX. 75205.

Illinois Turfgrass Conference and Show, Ramada Inn Convention Center, Champaign, Ill., **Dec. 12-14.** Contact: Dr. John R. Street, 106D Horticulture Field Lab, University of Illinois, Urbana-Champaign, Illinois, 61801.

Landscape Design Short Courses, Fisher Auditorium, OARDC, Wooster, Ohio, **Dec. 12-14.** Contact: Fred K. Buscher, Area Extension Center, OARDC, Wooster, Ohio, 44691.

National Arborist Assoication Seminar on Fertilization Trees, Hyatt Regency O'Hare, Chicago, IL, **Dec. 13-14,** Contact: NAA, 3537 Stratford Road, Wantagh, NY 11793, 516/221-3082.

Western Association of Nurserymen Trade Show and 89th Annual Meeting, Hilton Plaza Inn, Kansas City, MO, **Jan. 7-9, 1979.** Contact: WAN, Ed G. Gray, Executive Secretary, 2215 Forest Ln., Kansas City, MO, 66106, 913/236-5203.

Maryland Turfgrass Council Turfgrass '79, Baltimore Hilton, Charles Center, Baltimore, MD, **Jan. 8-10.** Contact: Charles Darrah, Dept. of Agronomy, U. of MD, College Park, MD 20742, 301/454-3715.

17th Nebraska Turfgrass Conference, Nebraska Center, University of Nebraska, Lincoln, Neb., **Jan. 8-10, 1979.** Contact: Dr. R. C. Shearman, Turfgrass Specialist, 105 Plant Industry Bldg., University of Nebraska, Lincoln, Neb., 68583.

48th Annual Winter School for Turf Managers University of Massachusetts, Amherst, Ma., **Jan. 8-Mar. 2, 1979.** Call: 413/545-2353.

The Irrigation Association Short Course Program, Center Pivot Irrigation, Denver, Colorado, **Jan. 9-11, 1979.** Call: 301/871-1200.

University of Florida Ag Research Ctr. Field Day, Ft. Lauderdale, FL, **Jan. 9, 1979.** Call: 305/581-8010.

Landscape Design Short Courses, Fisher Auditorium, OARDC, Wooster, Ohio, **Jan. 10-12, 1979.** Contact: Fred K. Buscher, Area Extension Center, OARDC, Wooster, Ohio, 44691.

New Hampshire Turf Seminar, Sheraton-Wayfarer Motor Inn, Bedford, NH, **Jan. 11-12.** Contact: George Esters, Dept. of Plant Science, University of NH, Durham, NH 03824.

Southeastern Pennsylvania Turf School and Trade Show, Westover Country Club, Jeffersonville, PA, **Jan. 16-17, 1979.** Contact: Wm. H. White, SE Corner Broad and Grange St., Philadelphia, PA, 19141.

Annual Kansas Christmas Tree Growers Winter Meeting, Holiday Inn, Manhattan, KS, **Jan. 19-21, 1979.** Contact: Shryll Hoffman, Rt. 1, Alta Vista, KS, 66834.

The Irrigation Association Short Course Program, Pumps and Pump Controls, St. Louis, Mo., **Jan. 23-25, 1979.** Call: 301/871-1200.

Southern Weed Science Society 32nd Annual Meeting, Sheraton-Biltmore Hotel, Atlanta, GA, **Jan. 23-25, 1979.** Contact: SWSS, Texas Agricultural Experiment Station, Route 3, Lubbock, TX 79401.

Western Pennsylvania Turf & Grounds Maintenance School-Trade Show, Howard Johnson Motor Lodge, Monroeville, PA, **Jan. 23-25, 1979.** Contact: Phil Sellers, 311 Jones Law Bldg. Annex, 331 Ross St., Pittsburgh, PA, 15219, or, Art Wick, P.O. Box 362, Sewickley, PA, 15143.

Massachusetts Horticultural Congress, Howard Johnson's 57 Hotel, Boston, Mass., **Jan. 24-25, 1979.** Contact: Deborah Fanning, coordinator, 715 Boylston Street, Boston, Mass., 02116, phone: 617/266-6800.

Mid-Atlantic Agricultural Chemical & Equipment Trade Show, Richmond Arena, Richmond, Va., **Jan. 24-25, 1979.** Contact: N. D. Thomsen, Publicity Chairman, Va. Pesticide Association, Rt. 1, Box 126, Prov. Forge, Va., 23140.

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Virginia Turfgrass Conference, Conference Center, Colonial Williamsburg, Williamsburg, Va., **Jan. 24-25, 1979.** Contact: J. F. Shoulders, Dept. of Agronomy, Virginia Polytechnic Institute and State University, Blacksburg, Va., 24061.

15th Annual Northern California Turfgrass & Environmental Landscape Exposition, San Mateo County Fairgrounds, Hall of Flowers, San Mateo, CA, **Jan. 24-25, 1979.** Contact: NCTC, P.O. Box 268, Lafayette, CA 94549, 415/283-6162.

Michigan Association of Nurserymen 1979 Convention and Trade Show, Civic Auditorium, Grand Rapids, MI, **Jan. 30-Feb. 1, 1979.** Contact: Call: 517/394-0236.

International Society of Arboriculture, Midwestern Chapter Annual Arborist's Seminar, Colony Hotel, 7730 Bonhomme Drive, Clayton, MO, **Jan. 31-Feb. 2, 1979.** Call: 314/863-0400.

ALCA 1979 Annual Meeting & Trade Exhibit, Galleria Plaza Hotel, Houston, Tex., **Feb. 4-9, 1979.** Call: 703/893-5440.

GCSAA 50th International Turfgrass Conference and Show, Atlanta, GA, **Feb. 4-9, 1979.** Contact: GCSAA Headquarters, 1617 St. Andrews Dr., Lawrence, KS, 66044.

The Irrigation Association Short Course Program, Agricultural Irrigation, Cincinnati, Ohio, **Feb. 6-8, 1979.** Call: 301/871-1200.

New York Turf & Landscape Association Annual Turf & Landscape Conference, Tappan Zee Inn, Mountain View Avenue, Nyack, NY, **Feb. 7, 1979.** Contact: Frank Claps, 136 Laurel Avenue, Larchmont, NY 10538, 914/834-6846.

Wisconsin Arborist Convention, Ramada Inn, Janesville, Wisc., **Feb. 7-8, 1979.** Call: 608/752-0581.

The Pennsylvania State University Turfgrass Conference, Sheraton Penn State Inn, State College, PA, **Feb. 13-16, 1979.** Contact: Dr. Joseph Duich, 21 Tyson Bldg., University Pk, PA, 16802.

Illinois Landscape Contractors Association Seminar, Indian Lakes Country Club, Bloomingdale, IL, **Feb. 14-16, 1979.** Contact: Carol Rachesky, 665 Forest, Glen Ellyn, IL, 60137, 312/858-8574.

National Arborist Association Annual Meeting, Marriott Hotel, Newport Beach, CA, **Feb. 18-22, 1979.** Contact: NAA, 3537 Stratford Rd., Wantagh, NY, 11793, 516/221-3082.

Capital Area Turf School, Hershey Motor Lodge, Convention Center, Hershey, PA, **Feb. 20-21, 1979.** Contact: Harold E. Stewart, 75 S. Houcks Rd., Ste. 101, Harrisburg, PA, 17109.

Landscape Design Short Courses, Fisher Auditorium, OARDC, Wooster, Ohio, **Feb. 21-23, 1979.** Contact: Fred K. Buscher, Area Extension Center, OARDC, Wooster, Ohio, 44691.

Annual Iowa Turfgrass Conference, Hilton Inn, 6111 Fleur Dr., Des Moines, IA, **Feb. 26-28, 1979.** Contact A. E. Cott, Ext. Horticulturist, Iowa State U., Ames, IA, 50011, 515/294-1870.

Northeastern Pennsylvania Turf School, Master Host Motel, Wilkes-Barre, PA, **Feb. 27-28, 1979.** Contact: Cy Chadwick, Ct. House Annex, 5 Water St., Wilkes-Barre, PA, 18702.

The Irrigation Association Short Course Program, Turf Irrigation, Calgary, Alberta, Canada, **Mar. 6-8., 1979** Call: 301/871-1200.

Reinders 4th Turf & Irrigation Conference — Equipment Show — Service Clinic, **Mar. 6-8, 1979.** Contact Ed Devinger, Reinders Bros., Inc., 13400 Watertown Plank Rd., Elm Grove, WI 53122, 414/786-3300.

Corrugated Plastic Tubing Association Annual Convention, Pier 66, Ft. Lauderdale, Fla., **Mar. 12-14, 1979.** Contact Robert Lowe, executive secretary, CPTA, 752 Leisure Lane, Greenwood, Ind., 46142, phone: 317/881-4552.

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